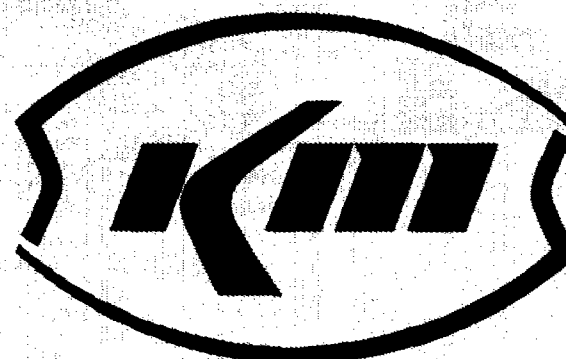




KERR-McGEE CHEMICAL CORPORATION



SCOPING AND PLANNING DOCUMENTS for EXCAVATION AND RESTORATION ACTIVITIES

**at the
LINDSAY LIGHT II SITE
CHICAGO, ILLINOIS**

**Submitted To:
U.S. EPA Region V**

**Prepared By:
Grant Environmental, Inc.
and
Kerr-McGee Chemical Corporation**

SCOPING AND PLANNING DOCUMENTS
for
EXCAVATION AND RESTORATION ACTIVITIES

at the

LINDSAY LIGHT II SITE
CHICAGO, ILLINOIS

This is the Scoping and Planning Documents for Excavation and Restoration Activities at the Lindsay Light II Site in Chicago, Illinois. This document was prepared in response to the United States Environmental Protection Agency, Region V Unilateral Administrative Order (UAO).

The UAO requires the Respondents, Kerr-McGee Chemical Corporation (Kerr-McGee) and Chicago Dock and Canal Trust (CDCT), to prepare these Scoping and Planning Documents. This summary identifies the plans, procedures, specifications, required appendices and attachments, and information included in the Scoping and Planning Documents. The summary assists reviewers and users of this document in locating specific information.

The planning documents on the following pages have titles shown in bold (i.e. **Removal Action Work Plan**). These documents are identified with blue tabs. Appendices or attachments to these documents are listed in italicized text (i.e. *Appendix B - Air Monitoring Plan*). These documents are identified with red tabs. Subparts to appendices or attachments are listed as underlined text (i.e. Gamma Radiological Survey SOP). These documents are identified with clear tabs. Where applicable, the Kerr-McGee assigned document number is provided after the document, appendix, or attachment title.

**LIST OF SCOPING AND PLANNING DOCUMENTS, ASSOCIATED APPENDICES,
ATTACHMENTS, AND SUBPARTS TO APPENDICES AND ATTACHMENTS**

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*Appendix A - Dust Control Plan
Document 101*

*Appendix B - Air Monitoring Plan
Document 102*

*Appendix C - Permitting and Access Requirements Plan
Document 103*

*Appendix D - Traffic Control Plan
Document 104*

*Appendix E - Site Security Plan
Document 105*

*Appendix F - Verification Sampling Plan
Document 106*

**Quality Assurance Project Plan
Document 200**

*Appendix A - Field Sampling Plan
Document 201*

*Appendix B - Job Descriptions
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Gamma Radiological Survey SOP
Document 210

Air Monitoring SOP
Document 212

Soil Sampling SOP
Document 214

Field Logbook SOP
Document 215

Work Order Development SOP
Document 216

Excavation SOP
Document 217

Borrow Sampling SOP
Document 220

Verification Survey SOP
Document 223

REF Facility Procedures

Construction Quality Assurance Plan Document 300

Attachment A - Specifications
Document 301

Section 01010
Summary of Work

Section 01020
Construction Health and Safety

Section 01030
Special Project Procedures

Section 01060
Compliance with Codes and Standards

Section 01340
Submittals

Section 01500
Temporary Facilities and Controls

Section 01560
Environmental Protection

Section 02010
Demolition and Debris Removal

Section 02200
Contaminated Material Loadout and Earthwork

Section 02220
Undermining Existing Features

Section 02840
Site Utilities

Section 03300
Cast-In-Place Concrete

Health and Safety Plan

Document 400

Appendix A - Kerr-McGee Medical Evaluation Program
Document 401

Appendix B - Kerr-McGee Respiratory Protection Program
Document 402

Appendix C - Kerr-McGee Safety Handbook
Document 403

Emergency Contingency Plan

Document 500

LINDSAY LIGHT II PROJECT

Work Plan

Title: Removal Action Work Plan

Document Number: 100

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Approved By:

Date: July 25, 1996

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REMOVAL ACTION WORK PLAN

Lindsay Light II Site

Chicago, Illinois

Submitted to:

U.S. EPA Region V

Office of Superfund

July 25, 1996

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Appendix D - Traffic Control Plan

Appendix E - Site Security Plan

Appendix F - Verification Sampling Plan

1. SCOPE AND OBJECTIVES

This Removal Action Work Plan (Work Plan) provides an overview of work which will be done during excavation and restoration activities at the Lindsay Light II Site (Site). The Site is currently a parking lot operated by System Parking (Lessee) on property leased from the current owner, the Chicago Dock and Canal Trust (CDCT). Kerr-McGee Chemical Corporation (Kerr-McGee) is a successor of the Lindsay Light II Site. Both CDCT and Kerr-McGee are respondents for the Lindsay Light II Site, as defined by Section 101(20) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. §9601 (20). CDCT entered into an earlier Administrative Order by Consent (AOC) with United States Environmental Protection Agency (U.S. EPA) to study the extent of subsurface radiation and radionuclide content before excavation. The site characterization study was completed by CDCT in May 1995 and Revision 3 of the report was issued in October 1995.

A Unilateral Administrative Order (UAO) for the removal activities at the Site, the effective date for which is July 3, 1996 was issued by the U.S. EPA on June 6, 1996.

As defined in the UAO, the cleanup criterion is set at 5 picocuries per gram (pCi/g) total radium (radium 226 plus radium 228) over background. Kerr-McGee, through its own personnel or qualified contractors, will be responsible for the following:

- Establishing local background from four samples taken on the Site at points where gamma exposure rates are lowest plus eight soil samples taken off-site, but in the immediate vicinity of the property;
- Removing soils, and other facilities as necessary, containing levels of radioactivity above the action criteria defined by the U.S. EPA;
- Restoring all areas disturbed by restoration and excavation work to original condition or as otherwise agreed with the property owner and/or lessee;
- Conducting off-site surveying and sampling as necessary and, at a minimum, implement 40 CFR 192, if deemed necessary, should extensive contamination be discovered beyond current Site boundaries; and
- Performing all work in a manner that is protective of human health and the environment.

The Work Plan describes the work to be performed and includes the procedures to be used. Ancillary documents, such as the Health and Safety Plan (HASP), Emergency Contingency Plan, Construction Quality Assurance Plan (CQA Plan), and the Quality

Assurance Project Plan (QAPP) provide additional work details and are referenced within the text of this Work Plan.

Section 2 of this document describes the management strategy and key personnel which will implement, control and monitor the work. Section 3 describes plan inputs. Sections 4.1 through 4.6 describe the work to be performed. The work process is described in approximate serial order. Section 4.7 discusses how the principle of "as low doses as reasonably achievable" has been applied to the Site work. Section 4.8 describes the data management procedures which will be used to manage data during the work. Appendix A describes measures to control dust which could result from excavation activities. Appendix B describes strategies and equipment to monitor the levels of dust and radioactivity, if any, in the air during excavation activities. Appendix C describes the known permits required, and the steps to be taken to obtain permission to complete the work. Appendix D describes measures to control traffic in the vicinity of the work. Appendix E describes measures which will be used to provide site security during the Site work. Appendix F describes the equipment and procedures which will be used to check areas of excavation and other restoration in preparation for requesting a final determination from the U.S. EPA.

CERCLA (also known as Superfund) regulations exempt work such as this, conducted on-site, from most local and state permits. U.S. EPA approvals will be required for both on-site and off-site work. Since off-site work is not exempt from permits, the County, City or other regulatory agencies may include permits for the following:

- construction of temporary driveways,
- transportation of materials,
- closure or restriction of sidewalk access, and
- drilling in public way.

2. MANAGEMENT STRATEGY AND KEY PERSONNEL

This section of the Work Plan describes the management structure that Kerr-McGee will use to accomplish the excavation and restoration activities.

2.1 PROJECT OVERVIEW

There are three phases of Critical Removal Actions at the Site. These are the Reconnaissance Survey, Characterization Investigation Gamma Radiation Survey, and excavation and restoration. The Reconnaissance Survey was completed by CDCT in June 1993. The Characterization Investigation Gamma Radiation Survey was implemented under an Administrative Order of Consent with CDCT according to the Work Plan for Site Characterization Investigation, Revision 3, and the final study was submitted to U.S. EPA on October 5, 1995. The objectives of the investigation were to identify the location and distribution of contamination at the Site, document concentration and source of radioactive materials at the Site, and determine whether the material exhibited characteristics of hazardous waste. The UAO defines the cleanup criterion to be 5 pCi/g total radium measured over the background level.

Kerr-McGee, as one of the Respondents named in the UAO, will conduct the excavation and restoration of the site. A more detailed description of the excavation and restoration activities is included in Section 2.2.

Prior to beginning excavation activities, Kerr-McGee will conduct further delineation drilling and sampling to better define the horizontal and vertical limits of the contamination.

After completing the excavation activities in individual areas, Kerr-McGee will perform ~~verification~~ surveys for demonstration that an area meets the cleanup criterion. After approval by U.S. EPA, Kerr-McGee will backfill the area and restore it to original condition.

2.2 EXCAVATION AND RESTORATION

Excavation and restoration comprises excavating contaminated materials, identified during Characterization Investigation Gamma Radiation Survey at the Lindsay Light II Site and subsequent delineation drilling, and restoring the areas disturbed by excavation activities to original condition or a condition agreed upon by the owner.

The following activities by Kerr-McGee are necessary to enable the project to begin:

- Obtain necessary authorizations to move excavated materials to Envirocare of Utah, Inc. for permanent disposal.

- Identify sources of borrow soil and topsoil that will be used for restoration; test the material to verify that it meets the project criteria for backfill; and contract for the purchase of acceptable material.
- Mobilize the excavation and restoration crew and provide necessary infrastructure to support the project.
- Notify the U.S. EPA and State of Utah authorities of the schedule for moving the waste materials to the permanent disposal facility in Utah.

For excavation and restoration activities to begin, Kerr-McGee will prepare a Work Order, as described in the UAO. This Work Plan will include the following activities:

Access areas
List remaining

- Information on how the Respondents have arranged with System Parking (the lessee) for the excavation and restoration activities.
- Identification of features such as pavement, shrubbery, structures, or utilities that the excavation and restoration activities must consider.
- Identification of the work to be accomplished at the Site, including utility relocation or protection, work on public properties or rights-of-way, excavation, and restoration.
- Identification of any required permits and permissions from governmental agencies and utilities.
- Establishment of air monitoring stations at the Site.
- Surveying the property, verifying that the excavation work has been completed, and requesting permission from the U.S. EPA to backfill the excavation.
- Backfilling the excavation and completing restoration of the Site.

The following activities must be accomplished to complete the project.

- U.S. EPA certifies that the terms of the UAO have been met.
- Kerr-McGee demobilizes the project work force.
- Kerr-McGee submits required documentation to U.S. EPA to complete the project.

2.3 PROJECT MANAGEMENT STRUCTURE

The management structure under which the project will be accomplished is illustrated in Figure 2.1 of this Work Plan. The Project Team includes U.S. EPA and its support organizations, Kerr-McGee and its technical support organizations, Kerr-McGee and contract laboratories, and construction teams comprised of Kerr-McGee personnel and subcontractors.

The duties and responsibilities of these positions and organizations are summarized below.

U.S. EPA, through its On-Scene Coordinator (OSC), will provide project direction and oversight. Ms. Vernetta Simon is the OSC. She will be assisted in her duties by the U.S. EPA Quality Assurance Officer, U.S. EPA staff and contractor support personnel.

The Kerr-McGee Offsites Project Manager will provide overall direction to Kerr-McGee's project activities. The Offsites Project Manager will identify and provide necessary project resources and coordinate overall project activities with the U.S. EPA OSC. He is the administrative point of contact between Kerr-McGee and the U.S. EPA. The position description for the Offsites Project Manager is included in Appendix B to the QAPP.

The Kerr-McGee Project Quality Assurance Supervisor will provide guidance on quality assurance/quality control (QA/QC) issues. This includes, but is not limited to, guidance regarding sampling, data validation, and chain-of-custody procedures. The Project Quality Assurance Supervisor will provide the Offsites Project Manager with copies of reports pertaining to QA/QC.

The Project Quality Assurance Supervisor functions independently from Kerr-McGee personnel directly responsible for accomplishing the excavation and restoration. He reports directly to the Kerr-McGee Offsites Project Manager and has access to higher levels of Kerr-McGee management with whom he can consult to resolve quality-related project issues.

The Offsites Manager is responsible for the day-to-day management of the excavation and restoration. He has the responsibility to control project work quality, maintain project records, and identify and schedule resources necessary to accomplish the excavation and restoration. He has the authority, within the limits of pre-approved budgets and normal Kerr-McGee purchasing and personnel procedures, to acquire the necessary subcontracts, purchase materials, and hire personnel as necessary to accomplish the work.

The Offsites Manager reports to the Offsites Project Manager. He is Kerr-McGee's contact for project-related field activities and communicates directly with U.S. EPA personnel regarding project status, problems and solutions, and other project activities.

*Names of people
who will be onsite
at all times*

4/6/5
Contract consulting engineers assist the Offsites Manager as requested, in technical aspects of project planning and execution. Currently, Grant Environmental, Inc. is working in this capacity for Kerr-McGee.

The Field Team Leader is responsible for excavation and restoration work. In conjunction with the Offsites Manager, the Field Team Leader controls project work quality and trains and manages construction crews.

In-house technicians and laboratory personnel complete the project staff. The laboratory provides analytical services to the project under the auspices of pre-established and approved quality assurance programs.

2.4 DELINEATION AND DESIGN

Kerr-McGee will implement a delineation drilling investigation to evaluate the extent of excavation and verify the information presented in the Report for Characterization Investigation Gamma Radiation Survey.

Based on results from the delineation drilling, Kerr-McGee will prepare a Work Order that includes sketches depicting the work to be done, the specifications that will govern the work, and the schedule according to which the work will be accomplished.

The Work Order will identify any utilities that may be involved in the excavation and restoration activities, and provide the contacts at the utility companies with whom the work must be coordinated.

If the excavation and restoration activities require any work on adjacent public lands or rights-of way, the Work Order will include design information describing this work. The design information will conform to the requirements of the cognizant public agency or governmental unit.

2.5 CONSTRUCTION

Excavation and restoration activities will be completed in accordance with the terms of the UAO, the specifications in the CQA Plan and the Work Order.

Work completed as a part of the excavation and restoration ordinarily will be completed according to the specifications in the CQA Plan. Construction on public properties, rights-of-ways, utilities or railroads will be completed in accordance with the applicable specifications of those entities, or other specifications that may be mutually adopted during the preparation of the Work Order.

Construction will be scheduled so that the excavation and restoration activities will proceed expeditiously from excavation to restoration. Construction normally will be scheduled only during daylight hours, Monday through Friday. Exceptions to this scheduling will be made where, for example, the Field Team Leader determines that

extended work hours will allow a work item to be completed or secured before a weekend or before inclement weather, or where transporting containers at night will avoid traffic congestion.

weekend work?

2.6 MAINTENANCE

The Owner will be responsible for maintaining the restored area beginning 30 days after restoration is complete. Subject to the Owner meeting this responsibility, Kerr-McGee will remedy defects in the restoration for a period of one year after restoration is complete. This warranty will not extend to damage or defects that are the result of the acts of others, including a failure by the Owner to maintain the restored area.

2.7 MONITORING

Kerr-McGee will monitor air around excavation activities while waste materials remain within the area where the actions are occurring. The Air Monitoring Plan is described in Appendix B to this work plan.

2.8 REPORTING

Monthly progress reports will be submitted to the U.S. EPA beginning 30 days after the date of U.S. EPA's approval of this Work Plan. The reports will be submitted monthly until termination of the UAO unless otherwise directed by the OSC. These reports will describe all significant developments during the preceding period, including the work performed, and any problems encountered, analytical data received during the reporting period, and developments anticipated during the next reporting period, including a schedule of work to be performed, anticipated problems, and planned resolutions

A final project report will be prepared and submitted within 60 days after the project is completed. This report will summarize actions taken to comply with the UAO. The report will include a good faith estimate of total costs incurred in complying with the UAO, a listing of quantities and types of materials removed off-site or handled on-site, a discussion of removal or disposal options considered for those materials, a listing of the ultimate destinations of those materials, a presentation of the analytical results of sampling and analyses performed, and accompanying appendices containing relevant documentation generated during the removal action. The final report will include certification by a person who supervised or directed the preparation of the report.

3. PLAN INPUTS

The extent of contaminated materials on the Site were identified in the Report for Characterization Investigation Gamma Radiation Survey and will be further evaluated by a delineation drilling program implemented by Kerr-McGee.

After completion of excavation and verification activities at the Site, the Offsites Manager, or his designee, will make a formal request to U.S. EPA for agency inspection. U.S. EPA, or its designee, will inspect the property, and review the testing data to verify that work has been completed and meets the verification criteria. After the excavation activities have been approved by the U.S. EPA and restoration to the original condition completed, the property owner and/or lessee will verify the restoration work meets his satisfaction.

+ take samples as
necessary to

Why not EPA
verify 2nd?
EPA separate
tests too?

4. METHODOLOGY

Kerr-McGee will be responsible for confirming the limits of removal for impacted soils, asphalt, concrete, booths, guard rails, and other impacted items. Kerr-McGee also will be responsible for the transport of impacted soils and debris to an approved disposal site, and for verification that the Site meets the cleanup criteria. Finally, Kerr-McGee will be responsible for the proper restoration of areas disturbed by removal activities, after U.S. EPA has notified Kerr-McGee that the Site may be restored.

*EPA verifies
site is clean.*

The site is approximately 186 meters by 66 meters (12,276 square meters). Areas requiring excavation activities range from one square meter to 650 square meters. The following sections describe the work to be done. Section 4.1 describes the separate work activities which likely will be common to most of the Site. Section 4.2 describes the personnel and crews who will complete the work described in Section 4.1 and also includes approximate estimates of the time which could be required to complete the various activities. Sections 4.3, 4.4, and 4.5 describe Traffic Control, Site Security, and Health and Safety Planning, respectively, associated with the excavation and restoration work. Section 4.6 describes monitoring associated with the excavation work.

4.1 DESCRIPTION OF WORK ACTIVITIES

Investigation and characterization of the Site was done according to AOCs issued by U.S. EPA. Information generated in the report was given to Kerr-McGee to define required excavations and restoration work on the Site.

For the purposes of describing the crews, equipment, and materials that could be necessary on this project, and for estimating the time that could be required to complete the work, Kerr-McGee has grouped the construction work into three separate "activities." These activities are:

- Site Preparation,
- Excavation Work, and
- Restoration.

The methods, equipment and work which will be required to remove contaminated soils and restore the Site are discussed in general terms. The general discussions and descriptions given below should provide a sufficiently detailed framework that excavation and restoration actions can be completed using the described methods and equipment.

At the present time, Kerr-McGee proposes to perform excavation and restoration activities. This Work Plan and other documents have been prepared to provide Kerr-McGee the option to use contractors for any or all of the work, should the requirements of schedules or specialty work (e.g., utility excavation and replacement, building demolition, and remodeling) make the use of subcontractors desirable or necessary.

Contractors used for any part of the excavation and restoration will be competent in the work they are hired to do. Contractor qualifications will be kept on file and submitted to the U.S. EPA.

Some of the items in the following descriptions are discussed in detail in other parts of this Work Plan. These are included in this section of the Work Plan to show how they fit into the sequencing and allow work to proceed in a timely and cost-effective manner.

4.1.1 Site Preparation

Site preparation includes all of the work which must be done before any excavation of soils can begin. The following sections discuss the work that will need to be completed before excavation can begin at the Site.

4.1.1.1 Access Agreements

The Respondents will provide and obtain access to the Site and contiguous off-site areas to which access is necessary. This access will include permission for U.S. EPA employees, contractors, agents, consultants, designees, representatives, and State of Illinois representatives to conduct actions the U.S. EPA deems necessary.

An in-depth description of the plan for obtaining access agreements is provided in Appendix C to this Work Plan.

During excavation and restoration activities, the property will not be used by System Parking.

4.1.1.2 Permits

The work described in this Work Plan may require obtaining some local, state, or federal permits and licenses. Under Superfund, Kerr-McGee is exempt from obtaining permits from the City, County, and State for the work done on the Site itself and adjacent areas necessary to complete the work. Compliance with the substantive requirements of such permits is required in any case. Also required are permits and authorizations for off-site activities, and compliance with City, County and State codes. These include, but are not limited to, permits and licenses to operate as a construction contractor, and permits and licenses to transport and store radioactive materials off-site. Permits are not required for work within the Site.

A list of the licenses and permits that may be necessary for Site excavation and restoration work, and an in-depth description of the management plan which will be used to review the work to be done and obtain the appropriate permits is provided in Appendix C of this Work Plan. A list of permits also is included in Section 01340 (Submittals) of the CQA Plan.

4.1.1.3 Site Survey

Prior to any work which could disturb any of the landscaping, facilities, utilities or structures on the property, the Field Team Leader, or his designee, will document the location and condition of all of the foregoing. Documented information will include at least the following.

- Field-locating the boundaries of the property areas to be excavated. Boundary locations will be determined with sufficient accuracy to allow the approximate extent of the area to be flagged or staked.
- Preparing a drawing of the property, showing the size and location or "best estimate" location of all surface landscaping, facilities, utilities and structures. The survey of the property will be tied to a known survey of the property so that information can be plotted on the drawings and used to guide excavation and restoration work. In all but exceptional cases, this drawing will be developed from information supplied by CDCT.
- Physically documenting the condition of all of the above. Photographs or videotape will be used to record the condition, color, etc., of any part of the property which might be affected by excavation and restoration work. This record will be prepared with sufficient detail that it can be used to determine that restoration work has been properly completed.

4.1.1.4 Management of Utilities, Buildings, and Landscaping

Some of the work for managing utilities, buildings and landscaping already has been discussed in this Work Plan. The previous discussions indicate how managing these items will affect the plan and schedule for completing excavation and restoration. The efforts to manage the work for these specific items are summarized and, as appropriate, further discussed below.

During excavation and restoration work, changes in the initially defined limits of excavation and restoration are possible. If these changes occur, the U.S. EPA, utility companies, and the property owner will be kept informed of any substantial changes and their effect on the scheduled restoration work.

4.1.1.4.1 Utilities

For the Lindsay Light II Site project, "utilities" include natural gas, water, sewer, communication, cable television lines, and electrical power distribution or collection systems. Prior to the physical property survey, city and utility company records concerning the construction (maps and plans showing horizontal and vertical location, materials, etc.) of the utilities in the general vicinity will be reviewed and consolidated on a single drawing. This drawing will be based on City maps. The appropriate utility companies or their designated representative will be asked to verify the location of the utility in the field by originating a request through the Chicago Utility Alert Network (DIGGER) phone number.

During the physical survey, the locations of these utilities will be "ground-truthed" by observing the locations of power and phone poles, above-ground transformers (where electrical distribution lines are below ground), manholes, water meters, natural gas meters, phone boxes, surface indications (such as depressions which can occur over trenches), and the location of the utility as marked by the company or its representative. The property owner will be contacted to obtain knowledge of the locations of utilities.

The locations of these indicators of utility locations will be plotted on the drawings (along with property lines, fences, guard rails, buildings, curbs, driveways and walkways, etc.) and compared with the estimated locations. Discrepancies greater than about three feet in location will be noted; specific discussions, especially concerning procedures for working near and response to and repair of damaged utilities, will be held with excavation and restoration crews.

Following surveying, the drawings showing the estimated vertical and horizontal limits of excavation will be compared with the utility location drawings. If these drawings indicate excavation will occur over and around the utilities, the excavation and restoration will be to City/County specifications. Discussions of utility locations will be held with excavation and restoration crews prior to and during work activities.

4.1.1.4.2 Buildings

Prior to beginning excavation work, all buildings and other structures and facilities will be located as described under Section 4.1.1.3. Excavation and restoration or decontamination of existing above-ground structures is not anticipated. However, should removal or decontamination of such structures be required, Kerr-McGee will prepare a supplement to the Work Order describing such work. This supplement will be submitted to U.S. EPA for review and to the property owner for approval prior to the removal or decontamination of the structure.

4.1.1.4.3 Landscaping

Because the property is used as a parking lot, landscaping is anticipated to be minimal. Trees and shrubbery on the east end of the site will be surveyed to document existing physical condition. Retain trees and shrubs where retention will not endanger human health or the environment. Trees and shrubs that need to be removed for excavation of contaminated material will be replaced. Prior to beginning any work, plans for restoring landscaping will be discussed with the property owner.

4.1.1.5 Mobilization

Mobilization includes the work which will be done to move equipment, supplies and personnel to the Site in preparation for beginning work. As soon as the type and extent of the work is known, and access to the work is allowed, equipment, crews, and locations for loadout and decontamination stations will be selected.

The entire property will be secured. A detailed description of the measures which will be used to secure the Site is provided in Appendix E to this Work Plan.

As part of mobilization, initial runoff controls will be established. As much as possible, control of runoff will be done by excavating from uphill to downhill, so any runoff is from unaffected areas to contaminated areas. Where necessary, small berms will be constructed around excavations with unaffected fill (any soil with radioactivity that is below the action criteria) or with sand bags to prevent runoff from flowing into them. Preventing runoff from contaminated areas onto unaffected areas should not be a problem, as contaminated areas usually will be excavated below the surface of surrounding (unaffected) areas. Where necessary, such as where the excavation is

into a slope, small berms will be constructed around the lower edge of the excavation to contain runoff within the excavated area. Any water which accumulates within contaminated areas will be pumped into suitable containers (55-gallon drums for small quantities and designated water trucks or vacuum trucks for larger quantities). The water will be kept at the Site and used for dust control within the Exclusion Zones, tested for free release, or transported to an approved disposal facility according to DOT regulations.

4.1.2 Excavation Work

Excavation work includes all activities necessary to excavate and remove identified radioactive soils from the Site and to restore the construction area to a condition comparable to that which existed before the excavation. Before beginning excavation and restoration work, a Work Order based on the site preparation work described above and showing the limits of excavation, the direction and sequence of excavation and restoration, the transport route and traffic controls, the locations of temporary storage areas on the property, and the restoration plan will be provided to the U.S. EPA and the property owner for review. Although the U.S. EPA will not formally approve the Work Order, they reserve the right to request modifications to it.

Excavation crews will be trained in the requirements of specific field work tasks (for example, bulldozer or backhoe operation, and so forth). No crews with less than one Site-trained operator and one Site-trained laborer will be allowed to do work at the Site, unless under the full-time supervision of an experienced foreman or supervisor. Notwithstanding this provision, no worker will be used on the project until he has received the health and safety training described in Section 4.5.

As discussed previously, the conditions or amount of work may change as excavation and restoration work progresses. Kerr-McGee will keep affected parties apprised of any changes in the work and will revise excavation and restoration plans accordingly.

4.1.2.1 Excavation

During Site preparation work, pavement markers showing the initial estimates for the vertical and horizontal limits of excavation will be set, except for shallow excavations, where only the horizontal limits of the excavation will be marked. Excavations will be accomplished in accordance with the Excavation Standard Operating Procedure (SOP-217). Excavation limits will be refined as excavation progresses. Markers inevitably may be lost, but the surveying done for site preparation will allow them to be replaced accurately, quickly and easily. The site surveying also will allow new markers to be set quickly and accurately, as necessary, based on sampling of excavated areas, using only a 200-foot tape measure and a hand-level. Accuracy to within 0.2 feet vertically and 0.5 feet horizontally across the property should be attainable without additional surveying.

The following criteria will be used to determine the starting point and direction of excavation. Ideally, both criteria can be fulfilled at the same time. Practically, the first criterion will take precedence.

- **Criterion 1:** Begin excavation at the farthest point from the loadout and decon areas, and progress toward the loadout. With this method, travel across unaffected areas will be minimized and any contamination on haul routes can be removed as work progresses.
- **Criterion 2:** Where possible, begin excavation at the most uphill point of an area and proceed downhill. This method will minimize the potential for runoff from contaminated areas into unaffected areas.

Remove uncontaminated asphalt and clean overburden lying above the radioactive soil. Segregate these materials for testing and possible reuse as backfill. After testing, if materials have radioactivity below the clean up criteria they can either be used as backfill or disposed off site as non-radioactive waste.

When the top of the radioactive soil is exposed, the initial cut will be made to within three inches vertically of the full depth of the estimated cut depth along the full length of the staked cut line. This depth then will be continued using the cut face and a tape measure to control the advancing cut. After the area has been excavated to this initial depth, a surface gamma scan will be done as described in the Appendix F, Verification Sampling Plan. Additional excavation will be done as necessary and indicated by the gamma scan. After the additional excavation, the gamma scan will be repeated, and the process of excavation and scanning will continue until the gamma scan indicates all soils with radioactivity greater than the activity criteria have been removed.

As much as possible, small areas will be excavated, verified clean and backfilled before the entire work is completed. Exceptions to this could include large areas in which verifications could be performed and the area backfilled in sections without hampering other continuing excavation activities.

Once Kerr-McGee believes an excavation meets the verification criteria, the Offsites Manager will make a formal request to the U.S. EPA for approval and permission to backfill. Immediately following notice from the U.S. EPA that cleanup criteria have been met, the excavation will be backfilled and restoration started.

Excavation and restoration activities will involve excavating limited areas and depths, sometimes within a limited space. Most of the equipment to be used for this work will be relatively small. In general, excavated materials will be loaded directly into 20-ton roll-off containers with small track hoes. Trucks will transport the 20-ton containers to the rail terminal where they will be loaded onto special rail cars for transport to an approved disposal facility.

During all excavation activities, measures will be taken to control and monitor dust. Air monitoring procedures have been described generally in Section 4.6 of this Work Plan and are described in detail in the QAPP and the Air Monitoring Plan (Appendix B to this Work Plan). In addition to the perimeter monitors described in the Air Monitoring Plan, small personal monitors will be used to track worker exposures. Within the property, dust generally will be controlled by misting and spraying active and completed excavations with water. All applications of water will be controlled to moisten but not saturate surfaces. If water cannot be obtained at the Site, temporary sources of water can be provided for construction activities from water trucks parked adjacent to the work

area or from portable plastic water tanks. Small (1,800 gallon) water trucks equipped with several hundred feet of hose and a pump can be used to spray water. Also, small pumps and hose can be used with the portable tanks to provide sufficient pressure and volume for dust control.

4.1.2.2 Buildings or Structures

Demolition of all or part of any buildings or structures within the Site is not anticipated; however, if such work is found to be necessary, Kerr-McGee will prepare and submit for U.S. EPA's review a supplement or change to the original Work Order.

If the excavation will be done adjacent to or upwind of a building or other structure, it may be necessary to protect the building from equipment, dust, or structural damage. Measures and methods for protecting and removing dust or soil from buildings are discussed briefly below.

- Whenever work will be done adjacent to a building or other structure that is to remain in place, construction personnel will be notified during the "tailgate" safety meetings. Procedures for working around the structure will be reviewed.
- The Field Team Leader will evaluate the need for bracing or shoring for foundation walls where the excavation will extend deeper than half the depth of the structure. Any needed protection will be installed. All evaluation and design of shoring and bracing will be done by qualified persons as required by the CQA Plan. Any special precautions for working around or removing shoring and bracing will be discussed in the "tailgate" health and safety meetings. Shoring and bracing also may be required during other work for the Site, such as in excavations greater than five feet in depth, adjacent to retaining walls or where unstable soil conditions exist.
- When an exterior wall is to be cleaned, material beneath or adjacent to the wall that is not contaminated will be covered with plastic and provisions will be made before beginning the cleaning to control cleaning fluids. Water may be controlled by taping the plastic to the wall or other surface with duct tape and then using slight excavations or 4 inch by 4 inch posts to form small catchments for containing any drips, spills or runoff.
- Large areas may be cleaned with high pressure, hot water washers. Where adjacent soils or surfaces are not contaminated, such areas can be cleaned manually to avoid contaminating the surrounding materials. Manual cleaning methods may include soapy water with rags and brushes and scraping with brushes or scrapers.

4.1.2.3 Materials Management

Actions to manage a removed material include all those taken from the time the material is removed until it reaches its final destination. Materials that are removed

from the property may be replaced in their original location, placed in another location on the property, salvaged, or sent to a local landfill if the materials meet the cleanup criteria. Most of the materials removed from the Site will be sent offsite. Materials that do not meet the cleanup criteria will be sent to an approved disposal facility.

Any work necessary to repair or restore stockpile areas will be included in the Work Order.

Procedures for transporting and loading materials already have been described. Unaffected trash and debris typically will be put into clean "rolloff" containers that will be provided and collected by licensed trash removal and disposal companies. Contaminated materials will be transported between the Site and the approved disposal facility according to DOT regulations. Procedures which will be used to minimize the potential for, and effects of, spills and accidents during transport include, but are not limited to, the following.

- Drivers will have the proper licenses, training and certifications for transporting potentially hazardous materials.
- Trucks transporting low-level radioactive materials will have sealed or lined containment. Covers for the roll-off containers will be placed over the load prior to exiting the contaminated area. Covers will be fastened down tightly to prevent materials from being blown out of the containers. This will minimize the escape of materials should an accident occur. Empty containers returning to the site will also have covers. Trucks supplying clean backfill, topsoil, and related construction materials will also be covered. The trucks will carry all necessary papers and placarding. Containers will be inspected prior to loading to determine suitability.
- Contaminated vehicles and equipment will be decontaminated using a pressurized water spray. Water generated during the decontamination activities will be evaporated or collected and stored on Site and used for dust control or for subsequent transportation to a disposal facility. A high pressure washer will remove contamination from the wheels, tracks, and other surfaces of the equipment and trucks.
- Prior to transporting excavated soils or other materials, all transport equipment will be frisked. Frisking will include tires and fenders and the sides and back of the bed. Frisking of the cab of trucks will not be considered necessary unless loading has been over the front of the truck.
- Travel between the property and the rail terminal will be only on specific routes selected to minimize the potential for, and the effects of, any accidents. Criteria used to select routes are described in Section 4.3 and Appendix D of this Work Plan.
- Traffic controls will be implemented to minimize the potential for accidents. These controls also are described in Section 4.3 and Appendix D.

contingency for
contaminated
spilling.

- An Emergency Contingency Plan has been prepared for this project. This plan includes procedures to be implemented in the case of an accident. All truck drivers will be trained in and familiar with such procedures.

4.1.2.4 Verification Sampling

As described under Section 4.1.2.1 (Excavation) of this Work Plan, the excavation area will be scanned as the excavation progresses. When this scanning indicates that all affected soils have been removed, formal, verification sampling will be done. Detailed descriptions of the verification sampling, analyses, and comparisons which will be done for this sampling are provided in Appendix F to this Work Plan.

Once Kerr-McGee believes an excavation meets the verification criteria, the Offsites Manager, or his designee, will make a formal request to the U.S. EPA for permission to backfill the area.

4.1.3 Restoration Work

For the Site, restoration includes the activities which are necessary to restore, to the extent practicable, the property to a condition equivalent to its pre-excavation condition. Unless specifically agreed by both Kerr-McGee and the property owner, the property will be restored to approximately original contours and condition, excepting where new materials must be used to replace old (e.g., replaced guard rails, parking bumpers, walks).

Plans for the restoration work will be prepared prior to starting site preparation work. The plans will be discussed with the property owner and/or lessee, and restoration work will begin as soon as possible after the U.S. EPA has approved the verification sampling.

Restoration crews will be trained in the requirements of specific field work tasks (e.g., uncovering utilities, berm construction, and backfill). Restoration workers that will not enter any exclusion zone will require a site orientation, but will not require 40 hour ~~Hazwoper~~ Training (29 CFR 1910.120), a Medical Evaluation, or Radiological Worker Training. Notwithstanding this provision, no worker will be used on the project until he has received the health and safety training described in Section 4.5.

All backfilling will be done with unaffected soils. Local gravel yards and other sources of fill material will be examined to locate suitable materials - suitable both structurally and environmentally. Procedures for chemically and physically testing soils are described in detail in the CQA Plan for the Lindsay Light II Site and the Field Sampling Plan (Attachment A to the QAPP). Procedures for radiological testing of soils are described in the QAPP. Fill materials will not be obtained from any source until testing has been done to show the materials are suitable for use under the requirements of the CQA Plan and the QAPP.

Compacted structural fill material will be placed around and beneath all structures, buildings and utilities. Topsoil will be properly placed to the full depth of the excavation or six inches, whichever is less, in all areas to be revegetated. Other special materials will be used as required by the CQA Plan. Replacement of fill around and beneath

utilities, and replacement or repair of any piping, equipment, structures, or facilities, will be done to the standards of the governing agency or company (see Section 02840 in Attachment A of the CQA Plan). Fill will be placed until the surface of the excavated area has been raised to the contours or grade and line of the approved reclamation plan. Dust control measures will be used until the surface is contoured and ready for landscaping or resurfacing.

Materials for restoration work may be temporarily stored at the Site. All storage will be done to minimize disturbance of areas not affected by the excavation and restoration work, and any damage to such areas will be repaired.

Repairs to buildings, if necessary, will be done concurrent with the backfilling work as much as possible. After the backfill has been placed and shaped, facilities and structures will be replaced and revegetation will be completed. Original materials and parts will be used where possible. All new construction will be to the standards of the building code, City or County ordinances and regulations, the CQA Plan, and the approved restoration plan.

All labor and materials used to restore any landscaping, utilities, facilities, structures and buildings will be warranted against defects for a period of one year. Warranty periods will begin on the date the restoration work is approved by the U.S. EPA. During the warranty period, all warranted defects will be repaired by Kerr-McGee personnel or contractors at no cost to the property owner. This warranty will not extend to damage or defects that are the result of the act of others, including a failure by owner to maintain the restored area.

Should excavation and replacement of soils, utilities, facilities, structures and buildings within municipal or public properties be necessary, the reclamation will be done in accordance with applicable standards of the City, County, or State. The Work Order will be submitted to the U.S. EPA for review and comment prior to starting an excavation at the Site.

Following completion of the restoration work, requests for approval of the work will be submitted to the property owner and/or lessee.

4.2 DESCRIPTION OF CREWS AND PRODUCTION/SCHEDULES

Construction activities have been identified in the previous sections of this Work Plan. These activities include survey/staking, radiological survey, general excavation, deep/trench excavation, and landscaping. The personnel required to complete each of these activities have been grouped into crews, and the crews are described below. Subcontractors may be used for work such as fencing, asphalt, and concrete.

Personnel, in addition to those described above, will be necessary for this work. These include health and safety personnel, quality inspectors, supervisors and other management personnel. These personnel are described in Appendix B of the QAPP.

4.2.1 Survey/Staking Crew

This crew will be responsible for physical surveys of the property. Physical surveys include locating utilities, structures, and landscaping for mapping, excavation and reconstruction purposes, locating grids for pre- and post-excavation radiological studies, setting stakes or other markers for excavation/fill control and for replacing landscaping and structures, and surveying excavations for calculating excavation and restoration quantities. A survey/staking crew typically will be made up of two people - an instrument man and a rodman.

4.2.2 Radiological Survey Crew

This crew will be responsible for verification radiological surveys of the excavated areas. Radiological surveys will also be done during excavation to determine when the excavation is suitable for final verification sampling. Radiological survey crews typically will include one or two people.

4.2.3 General Excavation Crew

This crew will be responsible for removal of all paved surfaces and all earthwork (excavation and backfill) except specialty excavation. For small areas, general excavation crews typically will include the following personnel - a backhoe/dozer operator, a loader operator, two laborers, and two truck drivers. For larger work areas, general excavation crews will be expanded to include additional personnel, as needed. The size of the crew will depend on the size of the work area and complexity of the work.

4.2.4 Deep/Trench Excavation Crew

This crew will be responsible for all earthwork which requires shoring or bracing, undermining utilities or structures, repair or replacement of utilities or structures, and backfilling around structures or utilities with special materials where compaction has to be 95% of standard proctor or better. As with the general excavation crew, the size of ~~this crew~~ will depend on the size of the work area and the complexity of the work. Typically, a single crew will include two operators (backhoe and loader), a pipelayer, a laborer, and two truck drivers.

4.2.5 Restoration Crew

This crew will be responsible for placing, compacting, and testing backfill; replacing topsoil, shrubs, trees, fencing, and other landscaping features following backfilling of excavated areas; and replacing asphalt and curbs. Typically, this crew will include one operator and one laborer; as with other crews, however, the size of the crew will vary with the size of the work area and the complexity of the work.

4.2.6 Production and Schedules

Delineation drilling will begin September 9, 1996, and excavation activities will begin October 28, 1996. Excavations are planned to be completed during early December of 1996. The Estimated Project Schedule is included a Figure 4.1.

It must be emphasized that this schedule is extremely aggressive and based on limited test data from the characterization study done under the earlier AOC. However, Kerr-McGee has prepared this schedule in response to the request by U.S. EPA Region V to complete excavation of contaminated soils during 1996. The project's completion within the constraints of this schedule is dependent upon the weather factors cited below, the timely approval of the Work Plan by U.S. EPA, the timely receipt of any required permits, and Kerr-McGee's successful negotiations with the disposal site operator for winter shipments.

Kerr-McGee is generally unable to excavate in cold weather due to its contract limitations with the disposal site operator, the freezing of soils in the shipping containers, the unavailability of asphalt product for restoration during the winter months, and the general prospects for inclement weather that would seriously affect soil-handling operations at the Site. If Kerr-McGee's request for winter shipments to the disposal site should be denied, if the start of the excavation is delayed for any reason, or if the delineation drilling should reveal that more extensive excavation than anticipated is required, the commencement of excavation would be postponed until mid-February 1997, and only delineation drilling would be completed in 1996. Postponement is justified because the public interest is not served by partial completion of the excavation before termination of activities for the winter, particularly in view of the fact that such an approach might entail an extended parking-lot shutdown and two mobilizations and demobilizations, while likely achieving only a slightly earlier completion of the project.

The sequence and requirements for the scheduled work, from Site Preparation through Excavation and Restoration, are described in Section 4.1 of this Work Plan.

4.3 TRAFFIC CONTROL

During excavation and restoration activities, trucks carrying excavated material will be traveling between the site and the local rail terminal. Truck traffic will not be very extensive and may be conducted during nighttime hours when local traffic congestion is minimized. Traffic controls will be implemented to minimize the potential for accidents to occur. A summary of the criteria which will be used to select the traffic routes is provided below.

- Adequate to support the loads. The selected route must be capable of supporting the trucks. Routes with small, light traffic bridges and surfaces of other than asphalt or concrete in good repair will be avoided where possible.
- Ease of travel. The route should minimize the number of stops and turns, and the streets should be sufficiently wide for two trucks to pass where other vehicles are parked on both sides of the street.
- Minimum other traffic. Major traffic routes should be avoided. The more traffic, the greater the potential for an accident to occur. Also, minor traffic routes generally have lower speed limits than major routes. Hours of hauling contaminated materials to the rail terminal will be selected to avoid rush-hour traffic.

- Approval of route. Kerr-McGee will prepare and submit route maps to the City of Chicago for approval.

A detailed description of the Traffic Control Plan is provided in Appendix D to this Work Plan.

4.4 SITE SECURITY PLAN

A detailed description of the Site Security Plan is provided in Appendix E to this Work Plan. This section of the Work Plan has been prepared to provide a summary of the measures which will be taken to access the property during excavation and restoration work and to minimize the potential for accidents during the work.

Work at the Site may create several potentially hazardous conditions. These conditions include, but are not limited to, the following:

- open excavations,
- moving construction equipment,
- truck traffic, and
- small quantities of dust.

To help minimize the potential for non-construction personnel to be exposed to these conditions, temporary fences, barricades, and signs will be placed around the property to prevent accidental entry into the property. Signs placed at 100-foot intervals on fencing used to secure the Site shall describe the work being done inside the fence.

The fencing will be maintained around the property until excavation and backfill work has been completed.

During non-operational hours, barricades, beacons, warning signs, temporary fencing, as appropriate, will be placed to prevent unauthorized entry into the work area. Signs will be placed on security barricades or exclusion zone fencing identifying certain areas as hazardous and prohibiting unauthorized entry. The warning signs will be installed at 30-foot intervals around the work area, as appropriate. Contaminated equipment will be left on-site within the fenced exclusion zone. This equipment will be secured with locks.

A guard or security service provided by CDCT will be used during operations for access control and during non-operational hours to periodically check the area.

4.5 HEALTH AND SAFETY

This section briefly describes the key personnel or types of personnel responsible for health and safety, the types of hazards which might be encountered during the monitoring which will be done, and personal protective equipment which may be worn for the different potentially hazardous conditions which might be encountered. Detailed descriptions of the health and safety measures which will be taken to protect workers

and other persons are provided in the Health and Safety Plan for the Kerr-McGee Lindsay Light II Site.

4.5.1 Key Personnel

While health and safety will be the concern of every person on the job, two persons will have health and safety as their primary concern. These are the Health and Safety Coordinator and the Field Team Leader.

The Health and Safety Coordinator will be responsible for the Quality Assurance (QA) portions of the Health and Safety Plan. The Health and Safety Coordinator will be responsible for reviewing daily health and safety reports, updating the Health and Safety Plan to include unanticipated conditions, and providing corporate support for implementation of the Health and Safety Plan.

The Field Team Leader will administer and supervise the Health and Safety Plan at the site level. The Field Team Leader will monitor all operations and will be the primary on-site contact for health and safety issues. The Field Team Leader will have full authority to stop operations if conditions are judged to be hazardous to on-site personnel or the public. The Field Team Leader also will be responsible for instructing all on-site personnel in the requirements ensuring all work is done in a safe and proper manner.

The Health and Safety Coordinator will have the responsibility for implementing those portions of the Health and Safety Plan related to radiation safety.

4.5.2 Potential Hazards

Potential hazards which could be encountered during excavation activities within the Site include contaminated materials (constituents of concern) and the hazards associated with construction work.

4.5.2.1 Constituents of Concern

Constituents of concern that may be encountered on the Site are the entire decay series (entire U-238 and Th-232 decay chains); however, measurements will only be made for Ra-226 and Ra-228. Radiologic and air monitoring, as described below, will be done during excavation to further define the presence of these constituents of concern.

The mechanisms of exposure for these materials are direct exposure, inhalation, ingestion, and eye/skin contact. The primary mechanism of exposure is direct exposure to external gamma radiation. All workers will be instructed in appropriate measures to protect against exposure to the above materials, and personal protective equipment (PPE) will be worn until monitoring shows such is not necessary.

4.5.2.2 Physical Hazards

Physical hazards which might be encountered at this site include, but are not limited to, the following:

- construction equipment (front-end loaders, backhoes, trucks, compactors and small dozers);
- power tools (saws, drills, jack hammers, compactors, etc.);
- heat and cold stress;
- overhead power lines;
- buried utilities;
- excavations;
- confined spaces;
- noise;
- demolition of structures and buildings, which could include overhead work and heavy lifting; and
- slip, trip and fall conditions, especially during freezing periods.

4.5.3 Training

Workers will be trained in the potential hazards of work at the Site before they are allowed to work on the project. The subjects included in the training, and the frequency of training updates, are described in the Project Training Program Procedure (SOP-LLII 100). If unaware of precautions associated with handling material with low-levels of radioactivity, local emergency personnel who may be called upon to respond to any emergencies at the excavation locations will be trained in managing such materials.

In addition to this formal health and safety training, "tailgate" safety meetings will be held each morning when work begins. These meetings may be led by the worker's foreman and every employee must sign in before beginning work. Tailgate meetings will be recorded. Lists of subjects covered and persons present will be a part of the meeting records. The Field Team Leader will review the meeting records. Health and safety monitoring results at the property will be discussed in the tailgate safety meetings when appropriate.

Visitors to the site will be briefed on the requirements of the Health and Safety Plan before being allowed within the work area and will be accompanied by a foreman or supervisor whenever possible. Regular visitors, such as U.S. EPA personnel, will be trained according to the crew training schedule and will not be subject to retraining before each visit.

4.5.4 Personal Protective Equipment (PPE)

Based on information from previous investigations, it is anticipated that most excavation work can be done in Level D PPE. Level D PPE for the Site includes coveralls, hard hat, steel-toed work shoes or boots, work gloves and safety glasses. If monitoring so

Will workers be
O6HA-40hr-
trained?

indicates, PPE requirements will be upgraded to include dust masks or half-face respirators.

All persons entering areas of the property designated as requiring PPE will wear the PPE appropriate to that area. Prior to exiting any exclusion zone, all workers and visitors will follow the decontamination and frisking procedures described in the Health and Safety Plan.

4.5.5 Monitoring

The Report for Characterization Investigation Gamma Radiation Survey to identify contaminated areas indicates the radiological conditions that may be encountered during work at the Site. Monitoring will be done during the excavation work to minimize the potential for unexpected conditions to occur undetected. In addition to the air monitoring described in the following section, real-time gamma surveys will be done during excavation work at the Site. Health physics technicians, or other personnel trained in the proper use of the survey instruments, will be responsible for the monitoring.

4.6 MONITORING

4.6.1 Air Monitoring

A primary goal during the excavation activities will be to control radioactive particulates from excavation, earth-moving and soil treatment activities as well as from resuspension of particulates from exposed soil storage piles. Fugitive dust generation is caused by a range of activities including excavation, loading, dumping, transporting and scraping using heavy equipment such as bulldozers, front-end loaders, dump trucks and graders. Traffic along site roadways also causes resuspension of particulates.

As part of the removal action, Kerr-McGee prepared an Air Monitoring Plan, Appendix B. The objectives of data collection for air monitoring activities are to:

- ensure worker and general population safety and provide radiological control information;
- evaluate work procedures and site control measures. In addition to identifying the need for corrective action, air monitoring also documents the effectiveness of such corrective action; and,
- measure releases of airborne radioactivity to the environment and ensure that people living and working in the surrounding area are not exposed to radiation above acceptable limits for the area.

4.6.1.1 Particulate Sampling

Air samples will be obtained from monitoring stations located around the Site. These samples will be analyzed promptly so that changes can be made to work practices and dust control measures, if necessary. Data from this monitoring will alert project personnel to potential environmental releases of airborne constituents. Particulate air

Don't use dust masks or respirators on CERCLA sites

monitoring stations will be placed downwind of the remediation areas. Remediation areas may be individual excavations or a group of adjacent areas at which excavations will be accomplished during the same time period.

4.6.1.2 Personal Samples

Personal monitoring to determine the exposure of workers to dust emissions will be conducted. A detailed description of this monitoring is included in the Health and Safety Plan.

4.6.1.3 Background Samples

Kerr-McGee will use the West Chicago Rare Earths Facility (REF) background air monitoring station #17, located 2 miles north of the REF, to measure background air quality in the area. Information from this station will be interpreted to be representative of area-wide background air quality.

4.6.2 Surface-Water Monitoring

Dust control is to be conducted in a manner that does not generate runoff. However, storm events may produce surface water runoff from excavation areas. If storms are anticipated, plastic sheeting may be placed over the excavation to minimize storm water contact. If surface-water runoff from excavation areas does occur, surface-water monitoring may be necessary.

4.7 APPLICATION OF ALARA TO EXCAVATION

The cleanup criterion established is 5 pCi/g of total radium (Ra-226 + Ra-228) above background. The cleanup criterion must be met in each 15 centimeter layer below surface. Areas where soils contain total radium in concentrations larger than the action criterion are included within the excavation activities. Averaging over areas up to 100 square meters is allowed, but only after reasonable efforts have been made to achieve as low as reasonably achievable (ALARA) levels. The principle of keeping ALARA ~~radiation doses~~ consistent with economic and social constraints also applies to excavation activities. ALARA typically has been implemented by the U.S. Department of Energy and the Nuclear Regulatory Commission by defining a limiting dose to a defined future site user, and decommissioning the site so that the potential dose to the user would be a fraction of the limiting dose.

Kerr-McGee will use this principle in implementing the excavation activities. ALARA and the numerical criterion will be met through a coordinated program of surveys and verification conducted by Kerr-McGee and approved by the U.S. EPA.

Kerr-McGee will remediate the Site and perform verification sampling to demonstrate that the soils meet the cleanup criteria.

Experience at many sites has shown that by establishing cleanup criteria that uses an action limit where practical as an upper bound on the residual radium activity, the average concentrations of soils remaining after excavation will be significantly less than the action limit. This procedure allows economic and social constraints to be

Too far away

Whoa

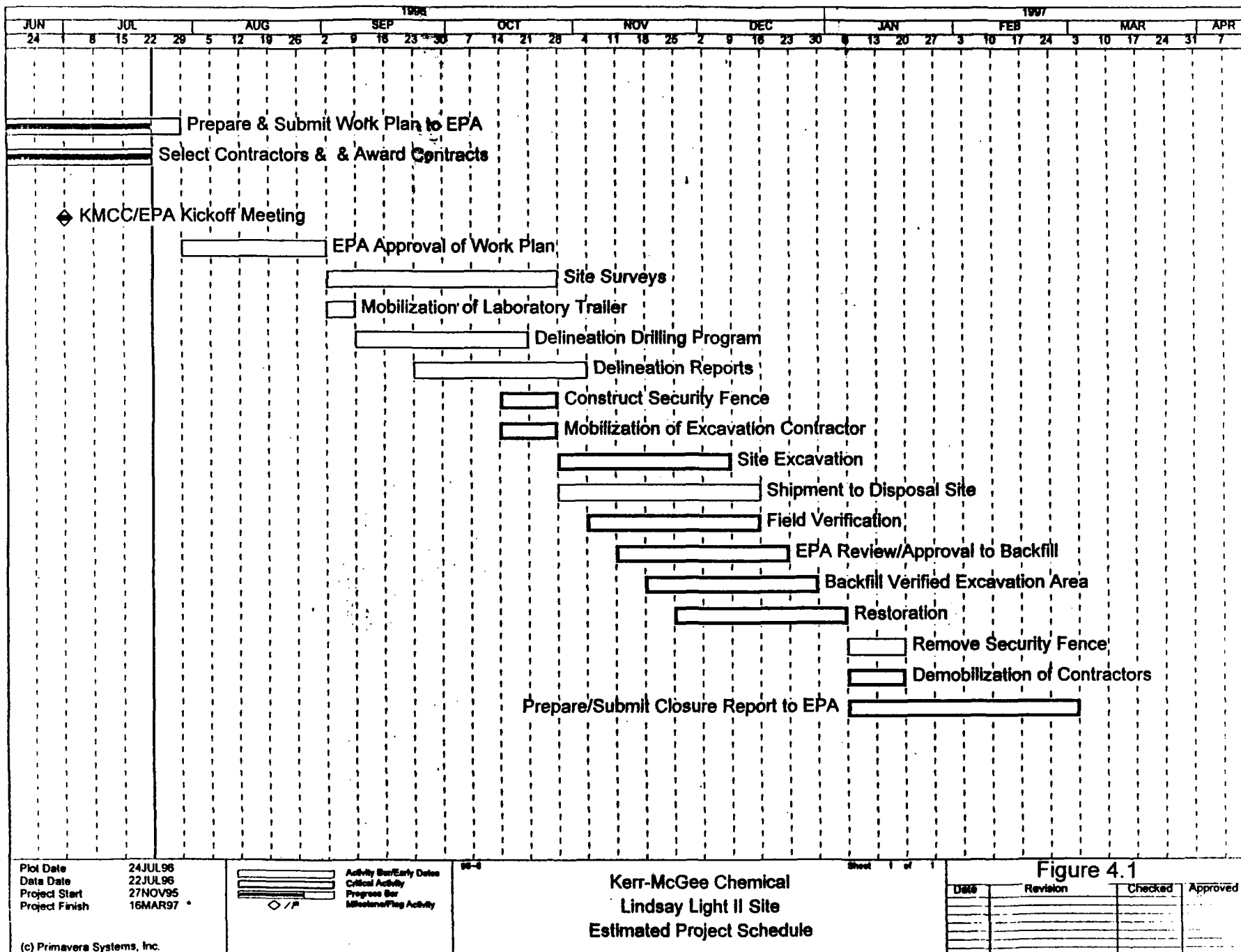
considered during excavation activities, while maintaining the average radium concentration below the established action limit.

4.8 DATA MANAGEMENT

Data management for the Site, as related to excavation activities, consists of health physics data, soil radioactivity data and civil construction data (i.e., land surveys, volume estimates, etc.).

Given the relatively short duration of excavation activities for this project, data can be effectively managed utilizing the paper records required by this Work Plan.

Health Physics databases at the West Chicago Rare Earths Facility (REF) will be utilized for air monitoring and dosimetry records. An on-site mobile laboratory will be used to analyze soil samples for verification that cleanup criteria have been met. The REF laboratory may also be used to analyze soil samples for verification that the cleanup criteria have been met. Copies of a data will be filed at the REF in accordance to SOP-LLII 101 "Filing System" procedure.



5. PLAN OUTPUTS

Completion of the activities described in Section 4 will be signified by acceptance by the property owner, lessee, and/or U.S. EPA of the physical facilities as meeting all specifications, drawings, and applicable governmental regulatory and code requirements.

LINDSAY LIGHT II PROJECT

Dust Control Plan

Appendix A

Title: Dust Control Plan

Document Number: 101

Revision Number: 0

Approved By:

Date: July 25, 1996

Replaces: None

APPENDIX A

DUST CONTROL PLAN

DUST CONTROL PLAN

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DUST CONTROL PLAN

1. PURPOSE

The Dust Control Plan (Plan) describes methods Kerr-McGee and its contractors will follow to conduct operations and maintain the work area within the Lindsay Light II Site (Site) so as to minimize the creation and dispersion of dust. This Plan also contains corrective measures that will be used in the event visual dust is created or air monitoring shows excessive particulates. *or air samples exceed limits*

A primary concern during the excavation activities at the Site will be the generation of radioactive particulates from excavation and earth-moving equipment. Fugitive dust generation may be caused by a range of activities including excavation, loading, and transportation of excavated soils. Traffic on the Site also may cause resuspension of particulates.

Dust control measures will be used throughout the excavation and restoration activities at the site, especially during excavation, backfilling, and grading activities.

2. GUIDANCE

Dust control will be performed in accordance with the Removal Action Work Plan (Work Plan), the Health and Safety Plan (HASP), and the Air Monitoring Plan (Appendix B to the Work Plan). Kerr-McGee will perform Site perimeter air monitoring in accordance with the Air Monitoring Plan.

3. IMPLEMENTATION

Kerr-McGee will be responsible for implementing dust control procedures as required in this Plan, the HASP, and the Air Monitoring Plan. The Field Team Leader will be responsible for ensuring compliance with the dust control procedures at the excavation site.

4. PRODUCTS

Water will be used in connection with mechanical dust suppression. Other suppressants such as chemical foams, resins, or polymers will not be used without written authorization by the U.S. EPA. If available, water will be obtained at the Site. If water cannot be obtained at the Site, temporary sources of water can be provided for construction activities from water trucks parked adjacent to the property or from portable plastic water tanks. Small (1,800 gallon) water trucks equipped with several hundred feet of hose and a pump can be used to spray water. Also, small pumps and hose can be used with the portable tanks to provide sufficient pressure and volume for dust control.

5. EXECUTION

Procedures to be followed to control dust may include traffic speed control, use of stockpiles, covering vehicles transporting borrow material and waste, and wind screens around excavation areas. These procedures will be utilized during excavation, restoration, transportation and associated materials handling activities.

5.1 TRAFFIC SPEEDS

Traffic speeds will be maintained in accordance with applicable County, City, State and Federal regulations. The speed limit for traffic on the site will be posted by Kerr-McGee or its representatives. In no case shall speed limits in excess of 15 miles per hour be posted.

5.2 USE OF STOCKPILES

Where possible, excavated materials will be removed on the same day they are excavated. Stockpiled material, including excavated and borrow material, will be piled to minimize dust generation. Further, slopes of stockpiled materials will be minimized in the prevailing wind direction. A 5:1 slope or flatter in the prevailing wind direction will be maintained whenever possible. Stockpiles will be constructed with their length perpendicular to the prevailing wind direction.

Stockpiled material will be covered during periods of high wind or when work on a stockpile is not actively occurring, such as the end of the work day. Stockpiles will be covered with a geomembrane cover to minimize dust generation during excavation and restoration activities. Approved geomembrane covers are Griffolyn TX 1200 manufactured by REEF Industries, Inc., and Sani-Cover SC #250 manufactured by Fluid Systems, Inc., or other equivalent.

5.3 OFF-SITE TRANSPORTATION OF EXCAVATED MATERIALS

Trucks used for transporting non-contaminated excavated or borrow material will be equipped with truck bed covers (tarps) to prevent the generation of dust from hauling. The tarps will be fastened down tightly to prevent materials from being blown out of the trucks. Empty trucks also will be tarped.

Roll-off containers for transporting low-level radioactive materials, will be lined with plastic or suitable leakproof liner and be equipped with full covers. The covers will be securely fastened to the containers before leaving the excavation area.

Trucks and other heavy equipment will be cleaned to remove mud, soil, and loose dust prior to leaving an excavation area. This cleaning will include the truck tires. Dirt that is tracked onto paved streets will be swept and added to stockpiles at the excavation area.

5.4 USE OF WATER AS A DUST SUPPRESSANT

Water will be applied during the course of excavation and restoration activities as directed by the Field Team Leader to prevent, mitigate, or reduce dust resulting from excavation activities. Water will be applied when:

- wind or vehicular traffic may cause visible dust generation;
- exposed surfaces of material stockpiles are potentially dry and wind or handling activities may cause dust generation;
- dust generation is possible during excavation activities on the site;
- hauling of excavated or borrow material may cause visible dust generation in truck beds; or
- dust generation is possible during placement of materials in stockpiles or fill areas.

A water truck or pump and storage tank assembly will apply water to the exposed ground surfaces via hoses, pumps, nozzles and other appurtenances as required. The truck or pump/tank assembly also will apply water to control dust generation from exposed surfaces of material stockpiles, excavation activities, and hauling or excavation of borrow material.

Water will be applied in sufficient quantity to prevent generation of dust, but not so as to cause the movement of water beyond site boundaries, ponding, or the disruption of other project site areas. Because the soils will absorb the water, watering is not expected to generate runoff. The Field Team Leader will monitor the excavation and restoration activities to make sure that enough water is used to adequately control dust, but that not too much water is used so as to create runoff.

5.5 CORRECTIVE MEASURES

If visual dust is created at a location during the excavation and restoration activities, or if air monitoring shows excessive particulates, the following corrective measures will be evaluated and applied as appropriate.

1. Increased wetting of surface areas.
2. Covering additional source areas.
3. Modifying future excavations and stockpiles to decrease the source areas.
4. Halting dust-creating activities until winds moderate.

If overwatering creates runoff into undisturbed areas, the water will be removed as practical, and the area radiologically surveyed. If radioactivity above the action level is found, the area will be cleaned by removing the contaminated materials, or by other appropriate means. Future occurrences will be prevented by more carefully controlling the amount of water applied by constructing earth berms around the area to retain the water, or by using a method of dust control other than water.

Modify work activities

Action level could include MCL, B, and limits

LINDSAY LIGHT II PROJECT

Air Monitoring Plan

Appendix B

Title: Air Monitoring Plan

Document Number: 102

Revision Number: 0

Approved By:

Date: July 25, 1996

Replaces: None

APPENDIX B

AIR MONITORING PLAN

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1. INTRODUCTION

The Air Monitoring Plan provides for: 1) measuring the concentration of radioactive airborne dust that could be generated and emitted into the atmosphere as a result of the excavation, construction and earth-moving activities planned at the Lindsay Light II Site (Site); and 2) complying with applicable regulatory requirements for monitoring radiological air quality. The Air Monitoring Program will provide data to identify and mitigate any potential negative impacts of the Site activities to workers and people living and working in the surrounding area.

The objectives of data collection for air monitoring activities are as follows:

- collect airborne radioactivity data to ensure worker and general population safety and provide radiological control information;
- collect airborne radioactivity data to evaluate work procedures and site control measures. In addition to identifying the need for corrective action, air monitoring also documents the effectiveness of such corrective action; and
- collect airborne radioactivity data to measure releases of airborne radioactivity to the environment and ensure that people living and working in the surrounding area are not exposed to radiation above acceptable limits for the area.

2. REGULATORY REQUIREMENTS

The excavation activities at the Site will be conducted in accordance with the terms and conditions of the UAO, the Removal Action Work Plan, the Quality Assurance Project Plan, the Health and Safety Plan, and all appendices thereto. Radiation exposures to workers, the public and the environment will be kept low in accordance with applicable regulations and the concept of maintaining exposures as low as is reasonably achievable (ALARA). The following discussion summarizes applicable regulatory requirements for excavation and restoration activities.

32 IAC 340.1050 specifies the radiation dose limits applicable to individuals in unrestricted areas. On January 1, 1994, IDNS revised 32 IAC 340 to conform to the current NRC 10 CFR 20 regulations. The revised Section 32 IAC 340.310 (revised the existing 32 IAC 340.1050) specifies the dose limits for individual members of the public, while proposed Section 32 IAC 340.320 allows a licensee to show compliance with the annual dose limit in Section 32 IAC 340.310 by measurement or calculation; or by demonstrating that the average concentrations of radioactive materials in gaseous and liquid effluents at the boundary of the unrestricted area do not exceed the limits specified in Table 2 of Appendix B to 10 CFR 20.

The Air Monitoring Plan is based on being able to demonstrate compliance with air effluent standards equivalent to the limits in Table 2 of Appendix B to 10 CFR 20 which are applicable to the excavation and restoration activities for radionuclides in the uranium and thorium series listed in Table 1. The effluent concentration of Derived Air Concentrations (DAC) corresponding to the most restrictive lung solubility class will be used, unless other documentation exists that will justify the use of less restrictive values.

3. AIR MONITORING DESIGN AND IMPLEMENTATION

3.1 INTRODUCTION

A primary concern during excavation activities at the Site will be generation of radioactive particulates from excavation and earth-moving activities as well as from resuspension of particulates from exposed soil storage piles. Fugitive dust generation may be caused by a range of activities including excavation, loading, dumping, transporting and scraping using heavy equipment such as bulldozers, front-end loaders, dump trucks and graders. Traffic along site roadways also causes resuspension of particulates.

The objectives of this Air Monitoring Plan, therefore, are to: 1) determine the concentration of radioactive airborne dust that is generated and emitted into the atmosphere as a result of the activities planned for the Site; 2) comply with applicable regulatory requirements for monitoring air quality; and 3) provide data which can be used to assess the potential impact of activities at the Site on the health and welfare of workers and residents in the surrounding area.

The following discussion provides more details of the planned activities for the Site, the specific design parameters of the air monitoring program and how the program will be implemented.

3.2 PLANNED ACTIVITIES

The types and locations of excavation activities at the Site were considered in order to identify and characterize those activities that have the potential for releasing radioactive dust particles or gases into the atmosphere. Water will be used during excavation activities to prevent, mitigate or reduce dust resulting from remediation activities. Traffic speeds will be kept low on all driveways, haul routes and exposed surfaces to minimize dust generation. Stockpiled material and material excavated during construction activities will be stored with flat slopes (5:1) in the prevailing wind direction whenever possible and covered with geomembranes to minimize dust generation. Containers used to transport excavated material will be covered. These dust control methods are intended to reduce dust generation dramatically. See Appendix A, Dust Control Plan.

Excavation activities at the Site are planned for the fall of 1996 if EPA approval is received so that excavation activities are completed in early December and approval for winter shipment is received from the disposal company. If EPA approval is not made prior to a date which these activities can be completed, excavation will begin in spring 1997. Activities will include excavation to remove all residual thorium-containing soil with total radium concentrations above action limits established for the Site. Impacted, excavated soil will be transported to an approved disposal facility. Non-impacted soil will be stockpiled near the excavations and used as backfill.

Without dust control measures, dust is likely to be generated during these excavation and restoration activities. Potential primary dust sources include the excavation operations, the excavated soil storage piles, and transportation of soil.

3.3 DUST EMISSIONS

The dust generated from activities at the Site will be present in a range of particle sizes. The smaller respirable size fractions are of greater concern in terms of the health and safety of workers as well as the general public. In particular, particulate matter with an aerodynamic diameter less than or equal to a nominal 10 μm (also known as PM-10 size particles) is the size range for which the United States Environmental Protection Agency (U.S. EPA) has established ambient air quality standards. However, for purposes of the air monitoring program at the Site, total particulate samplers will be used in the measurement of radioactivity associated with particulates in ambient air.

3.4 AIR MONITORING

The air monitoring program at the Site serves the purpose of measuring and documenting the levels of airborne radioactivity during the excavation activities. The monitoring data provide information for evaluating the potential hazard from specific operations taking place during the excavation activities. Typically, ambient air monitoring will be carried out near the boundaries of the excavation areas at the Site. During excavation activities at the Site, air monitoring will be done to measure radioactive particulates. Air monitoring will utilize high-volume or low-volume air particulate samplers.

Additional air monitoring will be carried out in accordance with the Health and Safety Plan. Air quality will be monitored in the breathing zone of workers in the exclusion zone using personal monitoring samplers and fixed-location or portable samplers.

High-Volume or Low-Volume Air Sample: High-volume or low-volume air samples will be obtained from monitoring stations located around the Site. The air monitoring program will alert project personnel to potential environmental releases of airborne contaminants that may impact off-site properties. Air monitoring stations will be placed downwind of the Site.

Personnel Monitoring: Personnel monitoring to determine the exposure of workers to airborne particulates will be conducted. A detailed description of this monitoring is included in the Health and Safety Plan.

4. IMPLEMENTATION

The following sections describe the particulate air monitoring procedures. Air monitoring will consist of particulate sampling to measure gross alpha radioactivity.

4.1 AMBIENT AIR PARTICULATE SAMPLING

4.1.1 Locations of Monitors

Air monitoring will be established at the Site before the excavation begins. Air samplers collect ambient air particulates on filters for subsequent counting. Air monitoring locations generally will be located downwind from the Site. Two air monitoring stations will be used at the Site.

4.1.2 Sampling Procedure

Sample volume requirements were determined based on minimum detectable activities (MDA) to be measured, and at the same time preventing the accumulation of excessive dust loading on the filters. These considerations indicated a high volume total particulate samples would be optimal for monitoring particulates during excavation and restoration activities. Air monitoring will be conducted in accordance with Standard Operating Procedure (SOP-212) in Appendix C of the QAPP. Standard equipment and sampling protocol will be used in the air monitoring program. U.S. EPA guidelines will be followed whenever feasible in establishing sites, quality control on air monitoring equipment, height of the sampling head above the ground, and sampler orientation.

The samples will be positioned to draw air at the breathing zone, at a height between one and two meters above ground, and collect particles on two-inch diameter filters. Samplers used will be appropriate for sampling total suspended particulates (TSP), be capable of operating continuously while maintaining a constant flow rate, and be equipped with timers and flow controllers.

Counting for low-level alpha radiation will be done in the laboratory in accordance with the REF's Health Physics and Site Procedures Manual.

4.1.3 Action Guide Levels

In the event the action levels in Table 1 are exceeded, the Health and Safety Coordinator will:

- verify laboratory data and calculations,

- analyze and review probable causes,
- evaluate need for reanalysis or additional analysis,
- evaluate need for resampling or sampling other pathways, and
- evaluate need for notifications to regulators.

Following these actions, the Health and Safety Coordinator may implement corrective measures. These corrective measures will include modifications to personal protection equipment and/or engineering controls such as to mitigate further action level exceedances (see Health and Safety Plan, Section 7.7).

TABLE 1

Derived Air Concentrations (DACs) and Effluent Air Concentrations of Selected Radionuclides in the Uranium and Thorium Series

Radionuclide	Class	10 CFR 20	
		DAC ($\mu\text{Ci/ml}$)	Air Effluent ($\mu\text{Ci/ml}$)
^{238}U	D	6×10^{-10}	3×10^{-12}
	W	3×10^{-10}	1×10^{-12}
	Y	2×10^{-11}	6×10^{-14}
^{234}Th	W	8×10^{-8}	3×10^{-10}
	Y	6×10^{-8}	2×10^{-10}
^{234}U	D	5×10^{-10}	3×10^{-12}
	W	3×10^{-10}	1×10^{-12}
	Y	2×10^{-11}	5×10^{-14}
^{230}Th	W	3×10^{-12}	2×10^{-14}
	Y	6×10^{-12}	3×10^{-14}
^{226}Ra	W	3×10^{-10}	9×10^{-13}
^{222}Rn	With Daughters Removed	4×10^{-6}	1×10^{-8}
	With Daughters Present	3×10^{-8}	1×10^{-10}
		or 0.33 of working level	
^{214}Pb	D	3×10^{-7}	1×10^{-9}
^{214}Bi	D	3×10^{-7}	1×10^{-9}
	W	4×10^{-7}	1×10^{-9}
^{210}Pb	D	1×10^{-10}	---
^{232}Th	W	5×10^{-13}	4×10^{-15}
	Y	1×10^{-12}	6×10^{-15}
^{228}Ra	W	5×10^{-10}	2×10^{-12}
^{228}Th	W	4×10^{-12}	3×10^{-14}
	Y	7×10^{-12}	2×10^{-14}
^{220}Rn	With Daughters Removed	7×10^{-6}	2×10^{-8}
	With Daughters Present	9×10^{-8}	3×10^{-11}
		or 1.0 working level	
^{212}Pb	D	2×10^{-8}	5×10^{-11}
^{212}Bi	D	1×10^{-7}	3×10^{-10}
	W	1×10^{-7}	4×10^{-10}
^{228}Ac	D	4×10^{-8}	2×10^{-11}
	W	2×10^{-8}	8×10^{-11}
	Y	2×10^{-8}	6×10^{-11}
$^{234\text{m}}\text{Pa}$	W	3×10^{-6}	1×10^{-8}
	Y	3×10^{-6}	9×10^{-9}
^{235}U	D	6×10^{-10}	3×10^{-12}
	W	3×10^{-10}	1×10^{-12}
	Y	2×10^{-11}	6×10^{-14}

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Pa-231

Ac-227

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LINDSAY LIGHT II PROJECT

Permitting and Access Requirements Plan

Appendix C

Title: Permitting and Access Requirements Plan

Document Number: 103

Revision Number: 0

Approved By:

Date: July 25, 1996

Replaces: None

APPENDIX C

PERMITTING AND ACCESS REQUIREMENTS PLAN

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PERMITTING AND ACCESS REQUIREMENTS PLAN

1. PURPOSE

The Permitting and Access Requirements Plan (Plan) describes the permits and access agreements required prior to implementation of excavation and restoration activities at the Lindsay Light II Site (Site). This Plan describes the procedures and estimated time frames for acquiring the required permits, and the procedures and methods to be implemented to ensure compliance with the permitting requirements.

The Plan also describes the procedures for obtaining the required access to the Site.

The Plan includes the procedures to be used by the Respondents, Chicago Dock and Canal Trust (CDCT) and Kerr-McGee Chemical Corporation (Kerr-McGee), and their contractors to ensure that buried underground utilities are not damaged during excavation and restoration activities. The Plan describes corrective measures to be taken in the event that such damage inadvertently occurs.

2. GUIDANCE

The following documents were reviewed in preparation of this Plan:

- Report for Characterization Investigation Gamma Radiation Survey for the Lindsay Light II Site, Chicago, Illinois, prepared by STS Consultants Ltd., October 1995.
- Zoning Ordinance of the City of Chicago, Illinois prepared by the City of Chicago.

3. IMPLEMENTATION

The Respondents will be responsible for assuring compliance with the Plan during the course of the excavation and restoration activities at the Site. The Site, situated in an urban area surrounded by commercial and residential buildings, is presently undeveloped and has been used as a parking lot in recent years.

3.1 PERMITTING AND SUBSTANTIVE REQUIREMENTS

Performance of the Removal Action Work Plan (Work Plan) will necessitate the issuance of various federal permits, licenses, and other formal consents. Under Superfund, the Respondents are exempt from obtaining federal, state or local permits for on-site work, although on-site work must comply with the substantive requirements of such permits. All applicable permits and authorizations are required for off-site

activities. Some permits, such as those issued by the Department of Transportation to commercial carriers to transport the excavated soils, debris and drummed liquids over public streets, will not be sought by the Respondents, but by their contractors. The Respondents will contract only with transportation companies qualified and licensed to carry such materials, and will advise them of traffic routes approved by the Chicago Police Department.

General permits include those required for the disposal of the excavated materials at the Envirocare of Utah, Inc. facility. Permits specific to potential work at the Site include those required for replacement of sidewalks, service walks, driveways and streets.

A list of the known licenses, permits, and other formal consents expected to be necessary for excavation and restoration activities undertaken on the Site is attached as Table 1. Those permits and other formal consents are discussed generally in the following sections.

A list of local substantive requirements related to the excavation and restoration activities is attached as Table 2.

3.1.1 General Permits

The general permits or other formal consents are applicable to excavation and restoration activities conducted within the Site.

Unilateral Administrative Order. While not a "permit," nevertheless, the Unilateral Administrative Order (UAO) issued by the Region V office of the United States Environmental Protection Agency (U.S. EPA) is the primary document directing the Respondents to commence excavation and restoration activities at the Site. The Work Plan and its subparts: the Dust Control Plan, the Air Monitoring Plan, the Permitting and Access Requirements Plan, the Traffic Control Plan, the Site Security Plan, and the Verification Sampling Plan will guide all activities undertaken during excavation and restoration activities. Supplementary to the Work Plan are the Quality Assurance Project Plan (QAPP) and the Field Sampling Plan, the Construction Quality Assurance Plan (CQA Plan), the Health and Safety Plan, and the Emergency Contingency Plan. The Work Plan and the other supplementary plans are scheduled to be submitted to the U.S. EPA within 30 days of the effective date of the UAO.

Once approved by the U.S. EPA, compliance with the requirements contained in these documents will be ensured by strict implementation of applicable quality assurance/quality control requirements by the Respondents and their contractors.

Permit from Envirocare of Utah, Inc. Kerr-McGee has contracted for the disposal of the excavated materials removed from the Site at a permanent disposal facility licensed to accept and permanently dispose of 11(e)2 byproduct material. The permit states that materials will be shipped no later than November 18th of each year to allow Envirocare adequate time to place the material in its facility before the winter shutdown. Kerr-

McGee is negotiating with Envirocare to accept materials after this date so that excavation activities can take place in 1996.

3.1.2 Specific Permits

Permits from the City of Chicago. The Respondents will obtain appropriate approvals from the City of Chicago Police Department for any temporary street closings or detours necessitated by the excavation activities and for proposed truck traffic routes for the transportation of contaminated materials excavated from Site to the disposal facility.

3.1.3 Substantive Requirements

Requirements from Cook County. The Respondents will comply with the substantive requirements of applicable and lawful ordinances of the Zoning Enforcement Division of the Cook County Building Department for control of erosion and storm water drainage within the Site.

Septic systems are not anticipated to be encountered during excavations. If it is determined that such systems exist, the Respondents will prepare a plan for septic systems required to be repaired or replaced as a result of excavation activities and will perform the work in compliance with the substantive requirements of applicable and lawful ordinances of the Zoning Enforcement Division of the Cook County Building Department and the Cook County Public Health Department.

Requirements from the City of Chicago. The Respondents will comply with the substantive requirements of applicable and lawful ordinances enacted by the City of Chicago for control of erosion and storm water drainage within and around the Site.

3.1.4 Maintenance of Permit Documentation

~~A file of general~~ permits required for excavation and restoration activities undertaken in connection with the Site will be maintained by the Respondents. All required general and specific permits will be obtained prior to the commencement of excavation and restoration activities at the Site.

The Respondents will provide to authorized personnel access to records and documentation in its possession related to the Site. Authorized personnel may include U.S. EPA employees, contractors, agents, consultants, designees, and representatives; and employees and agents of the City of Chicago and Cook County.

The Respondents will preserve all documents and information relating to the excavation and restoration work for ten years after the U.S. EPA provides notice pursuant to paragraph V.5 of the UAO.

3.2 ACCESS REQUIREMENTS

Subject to weather and related conditions, and upon receipt of all necessary permits, licenses, authorizations, or other consents described above, and after the Work Plan is approved by the U.S. EPA, the Respondents will begin activities at the Site.

However, in addition to receipt of these required permits, licenses, and authorizations, excavation activities may not commence until "Consent for Access to Property" has been executed by the tenant.

The Respondents will attempt to obtain such written permission from the tenant within 14 calendar days after the effective date of the Order. Attachment A includes a sample letter of the "Environmental Access Agreement."

In the event the Respondents are unable to obtain access to the Site, the Respondents will promptly notify the U.S. EPA in writing of their efforts to obtain access. U.S. EPA may then assist the Respondents in gaining access, to the extent necessary, to effectuate the excavation and restoration activities required, using such means as the U.S. EPA deems appropriate.

Prior to the start of excavation and restoration activities, the Respondents will survey the property and will prepare a brief plan including a layout drawing depicting the condition and location of existing asphalt, concrete, parking bumpers, buildings, and any vegetation or landscape within the Site or around the Site and access routes. This survey will include sufficient photographs to show all affected areas and any key features of the Site. Pre-work photographs/videotapes will be retained.

3.3 PROTECTION OF UNDERGROUND UTILITIES

The Respondents will contact the Chicago Utility Alert Network (DIGGER) at 312-744-7000, and will meet with the City of Chicago to determine the location of all underground utilities within the Site prior to beginning excavation activities. DIGGER will notify representatives from the local gas company, electric company, telephone and telecommunications companies, and the cable television companies.

In the event inadvertent damage to buried underground utilities occurs, the Respondents will contact the appropriate utility company and ensure coordination of prompt corrective measures or repairs.

TABLE 1
LIST OF PERMITTING REQUIREMENTS
FOR EXCAVATION AND RESTORATION PHASE
ACTIVITIES AT THE LINDSAY LIGHT II SITE

Type of Permit or Other Formal Consent Required	Issuing Agency or Approving Entity	Estimated Time Frame to Acquire Permit or Consent	Procedure Required to Attain Permit or Consent	Procedures/Methods to be Implemented to Ensure Compliance
UAO directing Kerr-McGee to commence Excavation and Restoration Phase activities	U.S. EPA	November, 1994	Federal Directive	<ul style="list-style-type: none"> o Familiarization of all project personnel with the Removal Action Work Plan, Quality Assurance Project Plan, Field Sampling Plan, Construction Quality Assurance Plan, Health & Safety Plan, Emergency Contingency Plan and all appendices thereto including this Permitting and Access Requirements Plan o Implementation of QA/QC procedures to verify compliance o Frequent communications with U.S. EPA officials in the form of formal written status reports, informal status meetings and telephone calls
Permission to dispose of 11(e)2 byproduct material	Envirocare of Utah, Inc. disposal facility	Permission received	Submission of application to Envirocare	Verification of materials shipped to Envirocare prior to shipment by KMCC and upon receipt at disposal facility in Utah by Envirocare
<ul style="list-style-type: none"> o Approval of truck routes for transporting soils from Lindsay Light II Site o Approval of any temporary closings of streets or alleys necessitated by excavation and restoration activities at the Lindsay Light II Site 	Police Department for the City of Chicago and the City of Chicago Department of Transportation	3 days	Submit proposed traffic plan to Police Department, City of Chicago	<ul style="list-style-type: none"> o Meet with City of Chicago Police Department to present proposed traffic plan o Revise traffic plan as required for Police Department approval o Inform Contractor and its drivers of the approved routes and ensure compliance by frequent mobile inspections

TABLE 2
LIST OF LOCAL SUBSTANTIVE REQUIREMENTS
FOR EXCAVATION AND RESTORATION PHASE
ACTIVITIES AT THE LINDSAY LIGHT II SITE

Requirement	Government Agency/Authority	Methods to be Implemented to Satisfy Requirements
Resurfacing, repair, replacement or excavation and restoration of any existing sidewalks, service walks or drive approaches in excess of 50 square feet in area, if any, outside Lindsay Light II Site	Zoning Administrator for the City of Chicago and City of Chicago Department of Transportation	<ul style="list-style-type: none"> o Preparation of excavation and restoration plans for each area o Communication with City DOT during course of excavation and restoration activities o City oversight during restoration activities o Inspection by City Engineer prior to placement of any portland cement, concrete, or bituminous concrete o Bond providing surety
Control of erosion and storm water drainage on Lindsay Light II Site	Zoning Administrator for the City of Chicago, DOT Construction Compliance Division and City of Chicago Environmental Control Examiner	<ul style="list-style-type: none"> o Comply with the substantive requirements of the City of Chicago Pollution Control Ordinance
Plans for fencing Site during excavation and restoration activities and plans for construction of temporary driveways.	Zoning Administrator for the City of Chicago, DOT Construction Compliance Division, and City of Chicago Environmental Control Examiner	<ul style="list-style-type: none"> o Preparation of fencing and driveway plans. o Communication with City DOT during course of excavation and restoration activities o City oversight during construction o Inspection by City Engineer

Attachment A

Sample of

“Environmental Access Agreement”

ENVIRONMENTAL ACCESS AGREEMENT

1. I (we), the undersigned, do hereby grant to Kerr-McGee Chemical Corporation ("Kerr-McGee"), its employees, authorized representatives and contractors; United States Environmental Protection Agency ("U.S. EPA"), its representatives and contractors; a license and permission to enter upon the property described as"

Property Address/Location: Lindsay Light II Site, between Grand Avenue and Illinois Street on the North and South respectively, and between McClurg Court and Columbus Drive on the east and west respectively.

for the purpose of conducting environmental testing, assessments, remediation, excavation, and restoration activities. Kerr-McGee is not U.S. EPA's representative with respect to liability associated with the Lindsay Light II Site activities.

2. Upon conclusion of the remediation and excavation activities, Kerr-McGee shall remove all its equipment, and excavated and/or disturbed areas shall be restored, to the extent practical, to original conditions. Sod or grass seed shall be used for areas that were grass-covered prior to excavation, and Kerr-McGee shall replace any paving or vegetation that has been removed.

Dated this _____ day of _____, 1996.

Owner

Current Lessee

LINDSAY LIGHT II PROJECT

Traffic Control Plan

Appendix D

Title: Traffic Control Plan

Document Number: 104

Revision Number: 0

Approved By:

Date: July 25, 1996

Replaces: None

APPENDIX D

TRAFFIC CONTROL PLAN

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TRAFFIC CONTROL PLAN

1. PURPOSE

The Traffic Control Plan (Plan) describes procedures the Respondents, Chicago Dock and Canal Trust (CDCT) and Kerr-McGee Chemical Corporation (Kerr-McGee), and their contractors will follow to protect vehicles and pedestrians at the Lindsay Light II Site (Site) and to protect workers from traffic accidents if work is required on or near roads or sidewalks during implementation of the excavation and restoration activities.

2. GUIDANCE

Guidance in developing this Plan was obtained from the Standard Specifications for Road and Bridge Construction compiled by the Illinois Department of Transportation (IDOTSPECS); the Highway Standards compiled by the Bureau of Design of the Illinois Department of Transportation (ILHWSTDS); the Standard Design Typical Application of Traffic Control Devices for Day Labor Construction on Rural Local Highways (BLR Standard 17) and the Standard Design Typical Application of Traffic Control Devices for Contract Construction on Rural Local Highways (BLR Standard 21-2) compiled by the Bureau of Local Roads of the Illinois Department of Transportation; the Standard Specification for Traffic Control Items adopted by the Illinois Department of Transportation, as amended; and the Illinois Manual on Uniform Traffic Control Devices, as amended.

3. PRODUCTS

Traffic control materials must conform to the following:

- IDOTSPECS, Section 784
- ILHWSTDS, Section F
- TIDOT Specifications (Standard Specification for Traffic Control Items)
- Section 02010 - Demolition and Debris Removal
- Section 02200 - Contaminated Material Loadout and Earthwork
- Appendix D of the Work Plan

4. SUBMITTALS

- A. Kerr-McGee shall develop, and update a traffic control schedule of street and sidewalk closings, partial closings and detours. The traffic control schedule and a route map will be submitted to the appropriate City agencies for approval.
- B. Copies of submittals to Kerr-McGee Offsites Manager and placed in project files.

5. EXECUTION

During excavation and restoration activities, trucks carrying excavated materials will be traveling between the Site and the rail terminal. A summary of the criteria which will be used to select the route is provided below.

- Adequate to support the loads. The selected route must be capable of supporting the trucks. Routes with small, light traffic bridges and surfaces of other than asphalt or concrete in good repair will be avoided where possible.
- Ease of travel. The route selected should minimize the number of stops and turns, and the streets should be sufficiently wide for two trucks to pass where other vehicles are parked on both sides of the street.
- Minimum other traffic. Major traffic routes should be avoided. The more traffic the greater the potential for an accident to occur. Also, minor traffic routes generally have lower speed limits than major routes.
- Lowest population density. Routes which pass hospitals, schools or other places with high concentrations of people should be avoided where possible.

As a part of the Work Order, the Respondents and their contractors will prepare a Traffic Control Plan. The plan will contain schedules for vehicular traffic control, pedestrian traffic control, and traffic control for the contractors' equipment. This plan will describe truck routes for transporting soils to the loading area from the Site. The plan will indicate any temporary traffic restrictions required for the remediation of the Site, and the dates and times when these restrictions will be effected. The Offsites Manager or his representative will deliver the plan to the Police Department, and discuss the plan with a Department Representative.

The Respondents will be responsible for keeping the work areas open to pedestrian and vehicular traffic to the extent practical and should provide safe passage of such traffic and continuous access for emergency vehicles.

The Respondents and their contractors will prepare a plan for pedestrian and vehicular traffic control to be compatible with excavation/restoration procedures employed at the

Site. The proposed excavation/restoration sequencing will be incorporated to form continuous traffic control schedules. Descriptions of proposed procedures for pedestrian and vehicular traffic routing and protection will be included in the immediate traffic area and the surrounding area during operational and non-operational hours.

Traffic control will be provided for work in and adjacent to streets, alleys and highways, as appropriate. For streets or alleys along or in which excavation/restoration activities are taking place, and for areas where contractors' vehicles are entering or leaving streets or alleys, warning lights will be installed informing traffic of excavation/restoration activities ahead.

For roadways restricted to one-way travel, traffic control signs will be installed at cross-streets, alleys and 100-foot intervals between. For unpaved trenches and other disturbed areas in pavement, flashing light barricades of either Type I or II will be installed to direct traffic onto undisturbed pavement. At cross-streets and alleys, Type III flashing light barricades will be installed to screen off disturbed areas in trenches.

During non-operational hours, no travel will be restricted on any streets, alleys, driveways, sidewalks, or cross-walks.

Barricade and warning sign arrangements will conform, at a minimum, to the ILHWSTDS requirements of 2305-6 and 2303-7 and BLR Standard 17 for excavation/restoration activities that are completed in a single day or that are longer in duration.

More extensive warnings, markings and controls will be set up in areas having special local conditions such as:

- high daily or hourly traffic volumes,
- unusual turning patterns,
- moderate to high pedestrian traffic,
- police, fire, ambulance, civil defense or other emergency services, and
- public works facilities.

With respect to the contractors' equipment, all such equipment and vehicles will be operated in accordance with applicable traffic laws and safety regulations. The equipment will have, at a minimum, appropriate warning lights and audible warning devices. Where the equipment enters or leaves public roadways, warning signs and barricades will be set up. In moderate and high vehicular traffic volume areas, flagpersons to control traffic and aid travel of contractors equipment will be provided.

The Respondents will inform their contractors and the contractors' drivers of the approved routes. The Quality Assurance Supervisor will monitor construction traffic to assure that the traffic is constrained to the prescribed routes.

LINDSAY LIGHT II PROJECT

Site Security Plan

Appendix E

Title: Site Security Plan

Document Number: 105

Revision Number: 0

Approved By:

Date: July 25, 1996

Replaces: None

APPENDIX E

SITE SECURITY PLAN

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SITE SECURITY PLAN

1. PURPOSE

The Site Security Plan (Plan) describes procedures the Respondents, Chicago Dock and Canal Trust (CDCT) and Kerr-McGee Chemical Corporation (Kerr-McGee), and their contractors will follow to control access to the Lindsay Light II Site (Site) during the excavation and restoration activities. It is important that access by unauthorized personnel to the Site during operational and non-operational hours be prevented because of hazards created by open excavations, moving contractors' equipment, and traffic.

2. IMPLEMENTATION

Site security will be directed by Kerr-McGee with guards furnished by CDCT to maintain site security 24 hours per day as follows: by a single guard to control access during hours of operation, and by use of a single guard, appropriate temporary fencing, barricades, and signs during non-operational hours. All contractor personnel will be issued identification badges that must be worn at all times while on Site.

During operational hours, the Respondents and their representatives will have access to the Site to implement the excavation and restoration activities. Access restrictions to the construction areas will be described, as will the various signs and barricades that will delineate these areas. This same information will be disseminated during the meeting that will be held at the beginning of the project (see Appendix C - Permitting and Access Plan) to discuss utilities that may enter the property.

All visitors desiring access to the Site will be required to register with the Offsites Manager or his designee before proceeding to the Site. The Offsites Manager or his designee will provide necessary orientation and training, provide radiation monitors as appropriate, and escort the visitors to the Site. While on the Site, the visitors will be required to observe all health and safety requirements, and follow all instructions given by the Field Team Leader. The Site may be inspected by various state and federal regulatory officials, as well as local City or County officials.

Regulatory and governmental officials who visit the Site regularly will receive appropriate training. When visiting the Site, they will receive permanent badges and radiation monitors, and will register with the Field Team Leader before entering the exclusion zone. Ordinarily, these persons will not be escorted. They will be required to

comply with all instructions of the Field Team Leader and observe all Health and Safety rules.

During non-operational hours, appropriate barricades, beacons, radiation warning signs, and temporary fencing, as appropriate, will be placed to prevent unauthorized entry into an exclusion zone. Signs will be placed on the site perimeter fencing identifying the Site as a construction area and prohibiting unauthorized entry. The warning signs will be installed at 30-foot intervals around the exclusion zone and 100 foot intervals on the perimeter fence. Contaminated equipment will be left on-site within the exclusion zone. Keys will be removed during non-operational hours.

A guard or security service will be used during non-operational hours to periodically check the area.

LINDSAY LIGHT II PROJECT

Verification Sampling Plan

Appendix F

Title: Verification Sampling Plan

Document Number: 106

Revision Number: 0

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Replaces: None

APPENDIX F

VERIFICATION SAMPLING PLAN

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1. INTRODUCTION

1.1 PURPOSE

This Verification Sampling Plan (Plan) describes the sampling activities and analytical methods that will be used by the Respondents, Chicago Dock and Canal Trust (CDCT) and Kerr-McGee Chemical Corporation (Kerr-McGee), to demonstrate the Lindsay Light II Site (Site) meets the cleanup criteria. By following the protocol included in this plan, the Respondents can give the U.S. EPA reasonable assurance the Site meets the cleanup criteria described in Section V.2.c of the Unilateral Administrative Order (UAO).

1.2 SCOPE

The verification survey will be conducted as excavation activities are completed at a Site. The purpose is to demonstrate the soils have been excavated to meet the cleanup criteria described in the UAO. The criterion must be met in each 15 centimeter layer below the surface. Averaging over areas up to 100 square meters is allowed, but only after reasonable efforts have been made to achieve levels As Low As Reasonably Achievable (ALARA). (Reference SOP-LLII 223 "Verification Survey Procedure").

1.3 CONTAMINANTS OF CONCERN

The verification program includes testing for specific constituents which are indicative of the contaminants of concern. Constituents of concern that may be encountered on the Site are the entire U-238 and Th-232 decay series; however, measurements will only be made for total radium (Ra-226 and Ra-228).

1.4 REFERENCES

The following references have been used in developing this Plan:

- Radiological Verification Plan for the Kerr-McGee West Chicago Rare Earths Facility, Rust Environmental and Infrastructure, August 1993;
- Administrative Order by Consent, U.S. EPA, 1996;
- 32 IAC 332.150(b) - Soil Radioactivity and Exposure Rate Criteria;
- DOE Order 5480.11 and 10 CFR 20 - Surface Contamination and Exposures (ALARA);
- Kerr-McGee Radiation Protection Manual; and

- NUREG/CR 5849 "Manual for Conducting Radiological Surveys in Support of License Termination" Draft June 92.

Standard Operating Procedures (SOPs) used during the verification sampling are included in the Quality Assurance Project Plan (QAPP), Standard Operating Procedures (SOPs) - Appendix C.

2. EXCAVATION CONTROL

2.1 GRID LAYOUT

The Verification Sampling Survey will cover the areas identified in the Characterization Investigation Gamma Radiation Survey (STS Report) that exceed background (as shown on Figures 3-2 through 3-14 of the STS Report) and any other area identified during any pre-excavation delineation sampling. These data will be used to plan the excavation.

The Verification Sampling Survey is a quality activity, and measurements will be made at similar locations to the STS survey and other pre-excavation surveys. This will allow the post-excavation readings to be compared with pre-excavation readings to assure that all identified areas requiring excavation are tested during the verification survey.

2.1.1 Equipment and Materials

Coordinates for the verification survey measurements will be re-established with conventional survey equipment. The following equipment, materials, and information may be used:

- Compass or theodolite;
- Cloth tape or steel tape;
- Stakes and/or survey flags.

2.1.2 Survey Procedures

Initial elevations and elevations after excavation has been completed will be obtained over all excavated areas. The following procedures will be used to establish coordinates for the verification survey:

- locate features with known positions from references or witness points placed or located during the STS survey, and
- draw baseline, permanent structures, and other areas of interest on the field drawing.

2.1.3 Documentation

The Verification Sampling Survey will be documented by preparing a scale drawing of the survey area showing the locations and results of the gamma measurements. The drawing will show the locations of and results of the soil samples analyzed in the laboratory.

2.1.4 Quality Control

The Field Team Leader will review information in the pre-excavation surveys to assure that all identified areas have been remediated, and that all remediated areas are included within the surveyed area. He also will assure that known reference points such as permanent structures are located properly on the drawing showing the survey results.

2.2 GAMMA SURVEY

A gamma survey will be done after the excavation is thought to be complete. The survey will comprise verification testing of the excavation.

Gamma measurements will be made over the entirety of the excavation. The procedure and instrumentation used will be similar to that used by STS. This procedure provides a gamma measurement survey over an area of approximately one-square-meter. The gamma measurements will be collected over the entire area of the excavation to determine the concentration of radium remaining. The Respondents will use appropriate correlations established by the U.S. EPA or independently by the Respondents to relate the survey measurements to total radium.

If the gamma survey indicates areas where the measured radium concentration exceeds the cleanup criteria of 5 pCi/g radium (Ra-226 and Ra-228) above background, additional material will be removed until the measured radium concentration is less than 5 pCi/g above background. Exceptions may be made to this operational criterion with U.S. EPA concurrence.

In addition to the gamma survey, the Respondents will obtain samples for laboratory testing to measure the total radium concentration of soils. Such testing may be used to resolve ambiguous gamma survey measurements, to establish or verify gamma/radium correlations, or to provide additional data to verify that the cleanup criteria have been met at the excavation. At least one composite soil sample will be taken for laboratory analysis from each excavation. The samples will be taken in accordance with the soil sampling procedure in SOP-214, and tested for radium (Ra-226 and Ra-228).

Natural variability within the Site will be considered in the verification testing by using U.S. EPA-defined background values appropriate for the particular area being surveyed.

Site Value
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2.2.1 Gamma Survey Procedure

The gamma survey will be performed according to the Gamma Survey Standard Operating Procedure (Document Number SOP-210) included as Appendix C of the QAPP.

2.2.2 Documentation

The Verification Gamma Survey drawing described above will be used to document the readings obtained during the gamma survey. The drawing also will contain information pertaining to background gamma radiation levels and instrument calibration.

2.2.3 Quality Control

The gamma survey will be performed by trained individuals who have sufficient skill to obtain accurate and consistent information. All information obtained during gamma surveys will be reviewed by the Field Team Leader for accuracy and consistency.

All field equipment will be calibrated either in accordance with NUREG/CR 5849 "Manual for Conducting Radiological Surveys in Support of License Termination" Draft June 1992 or with industry-recognized protocols. Instrument response background and check source tests will be performed and recorded daily to ensure instrument operations are within the established acceptable range.

At least 5 percent of the survey area will be resurveyed. Readings from the initial survey will be compared to those readings obtained during the quality control (QC) survey to identify instrument malfunctions or reading/document errors.

3. DECONTAMINATION

All discarded materials, waste materials, and other field equipment and supplies shall be handled in such a way to prevent the potential spread of contamination during excavation and restoration activities. Discarded items that have contacted contaminated materials will be containerized and stored for disposal at the approved disposal facility. Non-contaminated items to be discarded will be collected for disposal as non-hazardous waste.

Personnel and sampling equipment decontamination are described in the Gamma Radiological Survey Standard Operating Procedures included as Appendix C of the QAPP.

Wrong SOP

LINDSAY LIGHT II PROJECT
Quality Assurance Project Plan

Title: Quality Assurance Project Plan

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QUALITY ASSURANCE PROJECT PLAN

Lindsay Light II Site

Chicago, Illinois

Submitted to:

USEPA Region V

Office of Superfund

July 25, 1996

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LIST OF ACRONYMS/ABBREVIATIONS

ANSI	American National Standards Institute
ARARs	Applicable or Relevant and Appropriate Requirements
ASTM	American Standards for Testing Materials
BNA	Base-Neutral-Acid Extractables (Semivolatile Organics)
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act (Superfund)
CLP	Contract Laboratory Program
COC	Chain-of-custody
CQA	Construction Quality Assurance
cy	cubic yard (a measure of soil volume)
EMSL	Environmental Monitoring and Support Laboratory
DQO	Data Quality Objectives
FSP	Field Sampling Plan
FTL	Field Team Leader
IDNS	Illinois Department of Nuclear Safety
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NIST	National Institute of Standards and Technology
NPL	National Priorities List
NRC	U.S. Nuclear Regulatory Commission
PRP	Potential Responsible Party
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
REF	West Chicago Rare Earths Facility
RI/FS	Remedial Investigation/Feasibility Study
OSC	On-Scene Coordinator
Site	Lindsay Light II Site
SARA	Superfund Amendments and Reauthorization Act
SOP	Standard Operating Procedure
SOW	Statement of Work for Non-Time-Critical Removal Actions at the Kerr-McGee Lindsay Light II Site (Attachment 1 of UAO)
SW846	Test Methods for Evaluating Solid Waste, EPA-SW-846, 1986.
TSP	Total Solid Particulates
UAO	Unilateral Administrative Order
U.S. EPA	United States Environmental Protection Agency, Region V
VOA	Volatile Organic Analysis
VOC	Volatile Organic Compound

1. INTRODUCTION

1.1 GENERAL

The United States Environmental Protection Agency (U.S. EPA) requires that all environmental monitoring and measurement efforts mandated or supported by the U.S. EPA participate in a centrally managed quality assurance (QA) program.

Any party generating data under this program has the responsibility to implement minimum procedures to assure that the precision, accuracy, completeness, and representativeness of its data are known and documented. To ensure the responsibility is met uniformly, each party must prepare a written QA Project Plan (QAPP) covering each project it is to perform.

This QAPP presents the organization, objectives, functional activities and specific quality assurance (QA) and quality control (QC) activities associated with the excavation and restoration at the Lindsay Light II Site (Site). Specifically, this QAPP also describes the protocols which will be followed for air monitoring activities and sampling of backfill that will be used at the Site. Protocols described in the QAPP include sampling, sample handling and storage, chain-of-custody, and laboratory analysis.

All QA/QC procedures will be in accordance with applicable professional technical standards, U.S. EPA requirements, government regulations and guidelines, and specific project goals and requirements. This QAPP is prepared by Grant Environmental, Inc. in accordance with U.S. EPA QAPP guidance documents, in particular, the Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans (QAMS-005/80), and the Region V Model QAPP (1991).

The procedures developed for this QAPP include methods to evaluate constituents of concern. Constituents of concern that may be encountered on the Site are the entire thorium decay series; however, measurements will only be made for Ra-226 and Ra-228.

1.2 KERR-MCGEE QUALITY ASSURANCE PROGRAM

Kerr-McGee Chemical Corporation (Kerr-McGee) has developed this quality assurance program for the excavation and restoration of the Site. Consistent with Kerr-McGee policy, this program complies with the applicable parts of ANSI/ASQC Q9001-1994 (Quality Systems model for quality assurance in design/development, production, installation, and servicing).

The program provides positive management control and includes procedures and requirements to establish a record of conformance. This quality assurance program

together with approved work plans, established procedures, and work instructions provides the operational and administrative requirements for the excavation and restoration of this Site. Within this system, individual and organizational responsibilities are assigned for the activities and control measures necessary to achieve, verify, and document conformance.

Adherence to this program, approved procedures, and regulatory compliance requirements is mandatory for all Kerr-McGee Chemical Corporation and Kerr-McGee Corporation employees and for all contractor organizations.

1.3 PROJECT DESCRIPTION

1.3.1 Site History/Background Information

The Site at 316 East Illinois Street in downtown Chicago, Illinois, extends from East Illinois Street on the south to East Grand Avenue on the north. It is bounded by Columbus Drive on the west and McClurg Court on the east. Figure 1-1 is a location map, indicating the location of the property within the State of Illinois and the City of Chicago. The dimensions of the Site are 66 meters north to south and 186 meters east to west, making the Site about 12,276 square meters.

The property is presently undeveloped and has been used as a parking lot in recent years. The parking lot is paved with asphalt and has guard rails that border it. The property is situated in an urban area, surrounded by commercial and residential buildings. A shopping mall is located approximately 200 feet to the southeast. The Chicago River is located one quarter mile south of the Site, and Lake Michigan is about one quarter mile east of the Site.

The Chicago Dock and Canal Company was founded in 1857. The Chicago Dock and Canal Trust, the direct successor of The Chicago Dock and Canal Company, is a real estate investment trust formed in 1962. Both companies are included in the reference to "Chicago Dock." Chicago Dock records indicate that a portion of the property was leased to the Lindsay Light Company from about 1915 to 1932. These records also indicate that the property from 316 to 322 East Illinois was rented by Cooper's Stable prior to 1913. A two-story building on the property housed a stable for horses and wagons and a blacksmith shop.

In 1914, the Cooper Stable was divided in half, from east to west. The south half, fronting on Illinois at 316 East to 322 East, was leased by Lindsay Light. Chicago Dock's records indicate that Lindsay Light made rent and tax payments on this property until about 1932. The building was demolished around 1933, which is consistent with the cessation of rent payments by Lindsay Light.

Review of property records indicates that Lindsay Light probably performed its primary manufacturing operations in this area of Chicago at 161 East Grand Avenue, about one-quarter mile west the property. The operations at 161 East Grand Avenue included

the manufacturing of incandescent gas mantles. Some manufacturing and/or processing of thorium bearing monazite sand reportedly took place at the 316 East Illinois Site.

A principal ingredient in gas mantle manufacture is thorium as a nitrate. Small amounts of cerium, beryllium, and magnesium nitrates are also used. Thorium was extracted from the monazite sand using an acid leach. The gas mantles were then dipped into a solution containing the thorium nitrate to provide the mantle's incandescence strength.

Thorium occurs in nature principally as the parent radionuclide Thorium-232 in association with its daughter products in a decay sequence known as the Thorium Decay Series. It is believed that the principal source of contamination at this site is Thorium 232 and thorium decay series nuclides.

In June 1993, the U.S. EPA and Illinois Department of Nuclear Safety (IDNS) measured gamma radiation levels on portions of the Site (316 E. Illinois). The U.S. EPA and IDNS survey was conducted based on information U.S. EPA and IDNS had in their files which indicated Lindsay Light formerly had operations at the Site. Several areas of gamma radiation levels above the vicinity background levels were indicated (Figure 1-2 of the STS Report). A similar reconnaissance survey was conducted by STS Consultants for Chicago Dock Canal Trust in June 1993 which also found several areas of elevated gamma measurements. The results of the surveys suggested the presence of a subsurface gamma radiation source.

On January 27, 1994, an Administrative Order by Consent (AOC) was agreed upon by U.S. EPA and Chicago Dock Canal Trust. The AOC required preparation and execution of a Work Plan for a site investigation. That Work Plan was prepared and, following review and revision in response to review comments, was approved by the U.S. EPA on May 14, 1994. The investigation, completed through implementation of the Work Plan, was conducted with the objectives of identifying the type and quantity of the radioactive material, and the location and extent of contamination. The October 27, 1995 Report for Characterization Investigation Gamma Radiation Survey prepared by STS Consultants, Ltd. is the result of implementation of the work conducted in accordance with the approved Work Plan.

1.3.2 Project Objectives and Scope

Page 2-1 of the Removal Action Work Plan (Work Plan) describes the Reconnaissance Survey, Characterization Investigation Gamma Radiation Survey, and excavation and restoration at the Site. Kerr-McGee is one of the named Respondents in the UAO and is responsible for performing the excavation and restoration. Excavation and restoration comprises locating and excavating waste materials from the property. The property is a Superfund site identified as the Site. The actual extent of waste materials on the property will be identified by Kerr-McGee during implementation of a delineation drilling program and the course of the excavation.

In accordance with the UAO for removal actions at the Site, Kerr-McGee will implement the following task:

- **Excavation and Restoration** - Contaminated materials will be removed from the property to meet the cleanup criteria described in the UAO. Upon excavation of contaminated material above the cleanup criteria, the Respondents will conduct verification activities to confirm that the contaminated materials have been removed and the cleanup criteria have been met. If the cleanup criteria are not met, the Respondents will continue excavation activities as necessary to meet the criteria. When the property has met the cleanup criteria, the Respondents will backfill the excavated areas with uncontaminated soil and restore the property, to the extent practicable, to its existing original condition, or such other condition as the Respondents may arrange with the owner and/or lessee.

As part of this task, Kerr-McGee developed a QAPP and a Field Sampling Plan (FSP) for the following limited aspects of the work.

Air Monitoring Activities - The objectives of data collection for air monitoring activities are to:

- Collect airborne radioactivity data to evaluate the effectiveness of work procedures and site control measures. In addition to identifying the need for procedure modification, air monitoring also documents the effectiveness of such modifications.
- Collect airborne radioactivity data to measure releases of airborne radioactivity to the environment and ensure that people living and working in the area are not exposed to radiation above regulatory limits.

Sampling of Backfill Material - The objective of sampling of backfill material is to:

- No {
- Collect samples of backfill material to ensure that the material used to restore excavated properties is uncontaminated, i.e., the radiological composition of the backfill material must be within statistical ranges for the Site as established by the Respondents during the sampling of background samples from four locations taken on the property at points where gamma exposure rates are lowest and eight off-site locations in the immediate vicinity of the Site. The backfill soil types are described in the Construction Quality Assurance (CQA) Plan.

Backfill material may be obtained from onsite or offsite sources. For example, a source of onsite backfill material may be material excavated from a non-contaminated area. Whenever possible, this material will be returned to the original excavation. Onsite

backfill material will be excavated, stockpiled onsite, sampled, cleared for use, and used as backfill in the original excavation. Offsite backfill material may come from sources outside the limits of the Site.

Because backfill material may come from two different sources, two separate backfill clearing procedures have been developed for this QAPP.

1.3.3 SAMPLE NETWORK DESIGN AND RATIONALE

The sample network design and rationale for sample locations are described in detail in Section 2 of the Field Sampling Plan (FSP) in Appendix A.

1.3.4 PARAMETERS TO BE TESTED AND FREQUENCY

Sample matrices, analytical parameters, and frequencies of sample collection are shown in Table 1-1. Quality control (QC) samples are not included in this table. Constituents of concern have been selected based on constituents that possess the highest risk as a result of exposure. The constituents of concern are the entire decay series; however, measurements will only be made for Ra-226 and Ra-228.

1.3.5 DATA QUALITY OBJECTIVES

Data Quality Objectives (DQOs) are qualitative and quantitative statements which specify the quality of the data required to support decisions made during excavation and restoration activities and are based on the end uses of the data to be collected. As such, different data used may require different levels of data quality. There are five analytical levels which address various data uses and the QA/QC effort and methods required to achieve the desired level of quality. These levels are:

- **Screening** (DQO Level 1): This provides rapid but meaningful results. It is often used for health and safety monitoring at the Site, preliminary comparison to applicable or relevant and appropriate requirements (ARARs), initial site characterization to locate areas for subsequent and more accurate analyses, and for engineering screening of alternatives (bench-scale tests). These types of data include those generated in the field with HNu, pH, conductivity, and other real-time monitoring equipment at the Site. Health and safety monitoring will be considered Level 1 data.
- **Field Analyses** (DQO Level 2): This provides rapid results and better quality than in Level 1. This level may include mobile laboratory generated data depending on the level of quality control exercised. No Level 2 data will be generated during excavation and restoration activities.
- **Engineering** (DQO Level 3): This provides an intermediate level of data quality and is used for site characterization. Engineering analyses may include mobile lab generated data and some analytical lab methods (e.g., laboratory data with quick

turnaround used for screening but without full quality control documentation). The radiological laboratory results will be considered Level 3 data during excavation and restoration activities.

- **Confirmational** (DQO Level 4): This provides the highest level of data quality and is used for purposes of risk assessment, evaluation of remedial alternatives, and Potential Responsible Party (PRP) determination. These analyses require full Contract Laboratory Program (CLP) analytical and data validation procedures in accordance with U.S. EPA recognized protocol. The Respondents will generate no Level 4 data during excavation and restoration activities.
- **Non-Standard** (DQO Level 5): This refers to analyses by non-standard protocols, for example, when exacting detection limits or analysis of an unusual chemical compound is required. These analyses often require method development or adaptation. The level of quality control is similar to DQO Level 4 data. The Respondents will generate no Level 5 data during excavation and restoration activities.

last •
none of this expected
but don't rule out

The laboratory data will be done at Level 4 but will be presented as Level 3. Level 4 data will be available if needed to resolve ambiguities or problems.

1.3.6 PROJECT SCHEDULE

Project schedules are prepared per the Project Scheduling procedure (SOP-LLII 102).

Delineation drilling will begin September 9, 1996, and excavation activities will begin October 28, 1996. Excavations are planned to be completed during early December of 1996.

It must be emphasized that this schedule is extremely aggressive and based on limited test data from the characterization study done under the earlier AOC. However, Kerr-McGee has prepared this schedule in response to the request by U.S. EPA Region V to complete excavation of contaminated soils during 1996. The project's completion within the constraints of this schedule is dependent upon the weather factors cited below, the timely approval of the Work Plan by U.S. EPA, the timely receipt of any required permits, and Kerr-McGee's successful negotiations with the disposal site operator for winter shipments.

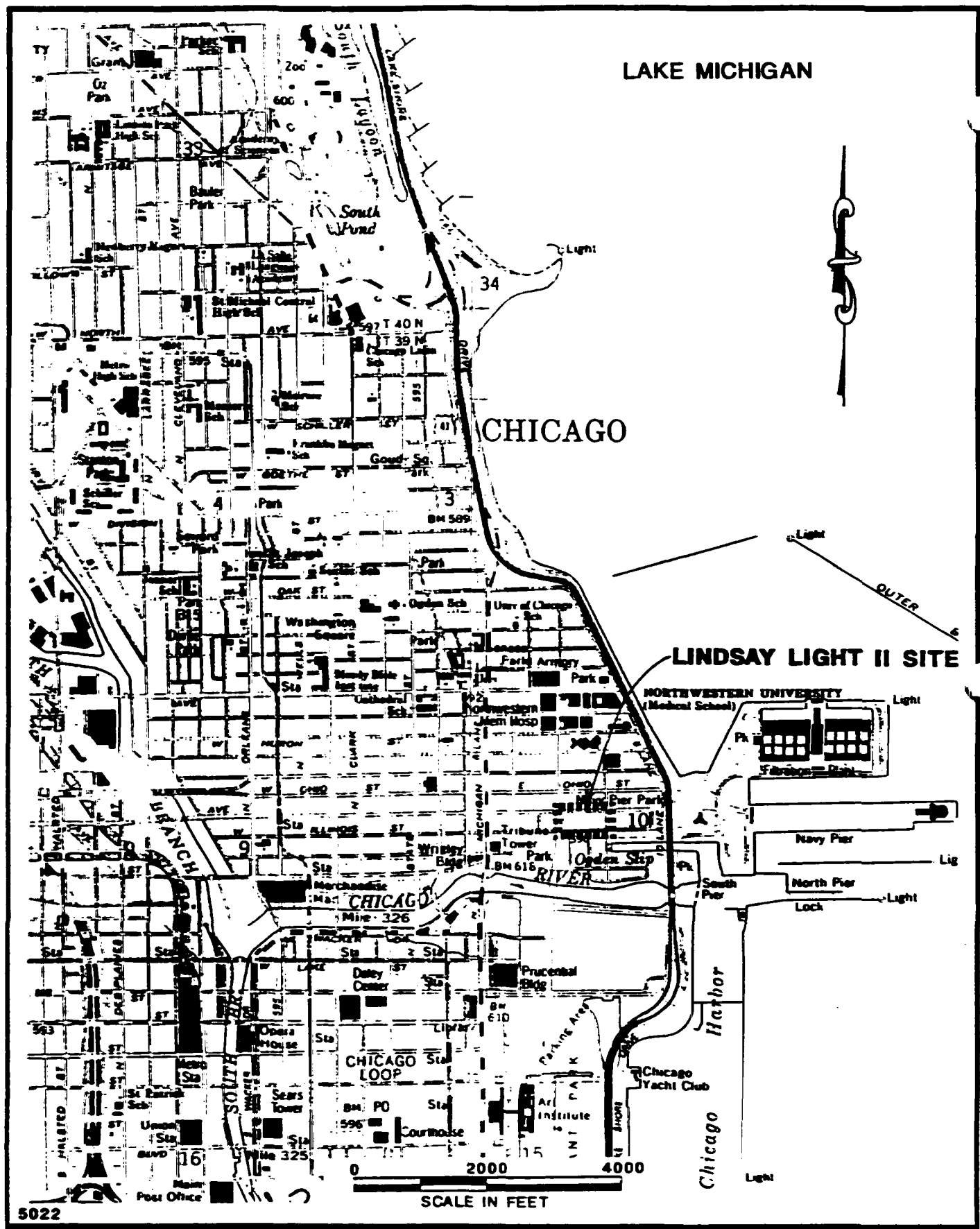
Kerr-McGee is generally unable to excavate in cold weather due to its contract limitations with the disposal site operator, the freezing of soils in the shipping containers, the unavailability of asphalt product for restoration during the winter months, and the general prospects for inclement weather that would seriously affect soil-handling operations at the Site. If Kerr-McGee's request for winter shipments to the disposal site should be denied, if the start of the excavation is delayed for any reason, or if the delineation drilling should reveal that more extensive excavation than anticipated is required, the commencement of excavation would be postponed until

mid-February 1997, and only delineation drilling would be completed in 1996. Postponement is justified because the public interest is not served by partial completion of the excavation before termination of activities for the winter, particularly in view of the fact that such an approach might entail an extended parking-lot shutdown and two mobilizations and demobilizations, while likely achieving only a slightly earlier completion of the project.

The sequence and requirements for the scheduled work, from Site Preparation through Excavation and Restoration, are described in Section 4.1 of this Work Plan.

An estimated schedule of excavation and restoration activities is included as Figure 1-2.

The Respondents will develop a more detailed schedule as the extent of contamination is identified. In addition, the Respondents will identify and maintain sufficient personnel and excavation crews to expedite the excavation and restoration activities.



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FIGURE 1.1

SITE LOCATION MAP

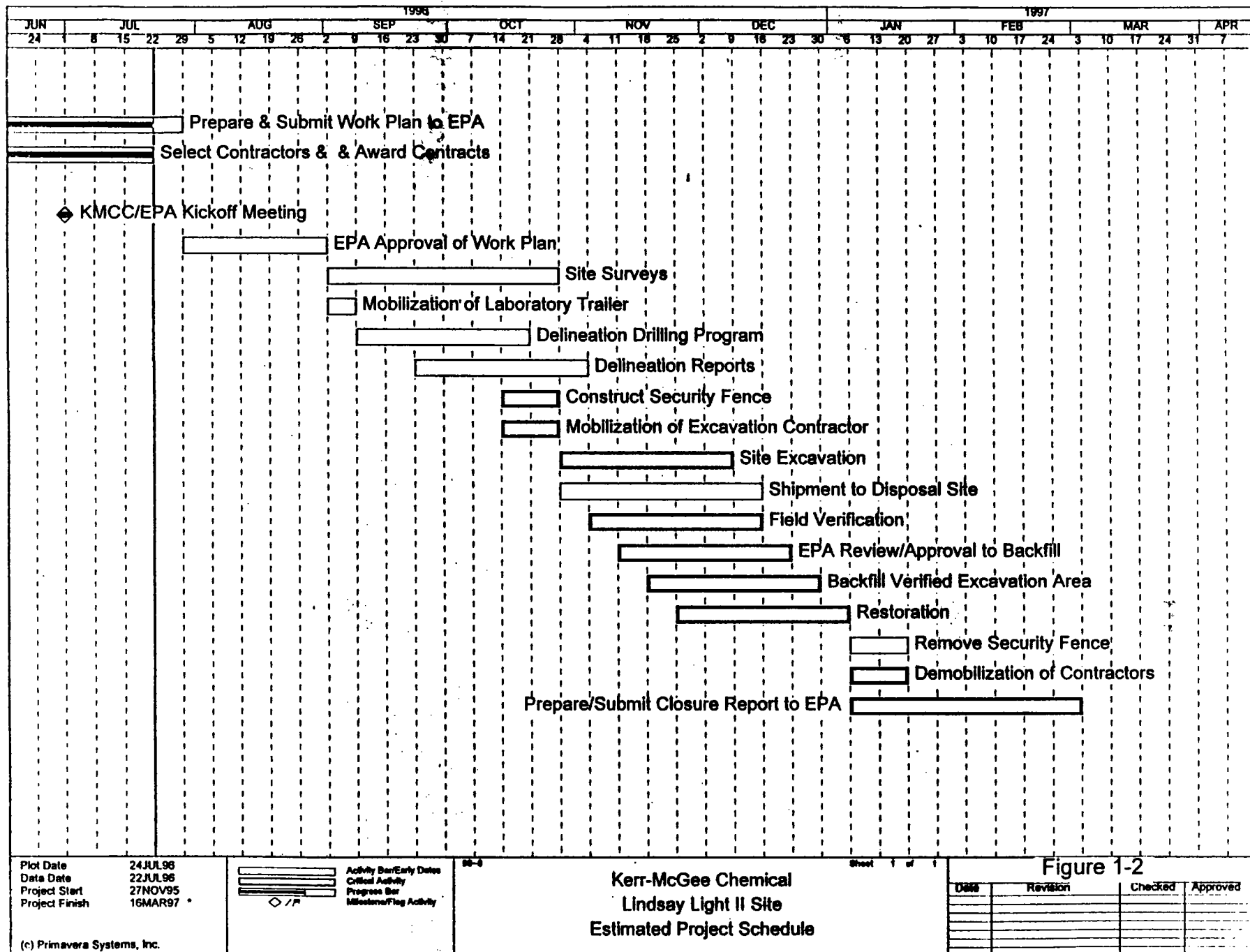


Table 1-1

Summary of Sample Collection and Analysis ^(a)

Purpose	Sample Method	Ra-226 and Ra-228 Analysis	Total Suspended Particulates Analysis
Air Monitoring	High-Volume Air Monitoring Station	(a) (b)	(a)
Backfill Sampling (On-site Source)	Soil Sampling	(c)	-
Backfill Sampling (Off-site Source)	Soil Sampling	(c)	-

(a) A minimum of two samples collected from two separate sampling locations per 8 hour period (one day of operation) per work area. Filters will be changed daily.

(b) Air samples will be tested for gross alpha.

(c) Borrow sampling frequency defined in Field Sampling Plan.

Table 1-2
Data Use and Quality Objective

Analysis Method	Data Use	Analytical Level
High-Volume Air Monitoring Station (Radiological) ^(a)	Air Monitoring	3
Laboratory Gamma Spectroscopy ^(b)	Backfill Confirmation	3

*11/10/2004
X - money uses
from backfill*

(a) Gross alpha measurements

(b) Radiological Analysis for Ra-226 and Ra-228

2. PROJECT ORGANIZATION AND RESPONSIBILITY

Kerr-McGee has responsibility for conducting excavation and restoration activities, and is the contractor in the following discussion. Kerr-McGee will develop and implement a site Health and Safety Plan (HASP), perform construction oversight including excavation then transport and disposal of material exceeding cleanup criteria, obtain soil samples to establish local background, conduct off-site surveying and sampling as necessary, and manage the project. Grant Environmental, Inc. (Grant) or a similar firm will be a contract consulting engineer to Kerr-McGee. The various quality assurance and management responsibilities of key project personnel are defined below and shown in Figure 2-1.

2.1 ON-SCENE COORDINATOR

The On-Scene Coordinator (OSC) has overall responsibility for all phases of the Site cleanup. The OSC for the U.S. EPA Region V is Vemeta Simon.

2.2 KERR-MCGEE OFFSITES PROJECT MANAGER

The Kerr-McGee Offsites Project Manager has overall responsibility for ensuring that the project meets U.S. EPA objectives and Kerr-McGee quality standards. The Offsites Project Manager is the principal point of contact between Kerr-McGee and the U.S. EPA.

2.3 OFFSITES MANAGER

The Offsites Manager is responsible for implementing the project, and has the authority to commit the resources necessary to meet project objectives and requirements within established budgets and schedules. The Offsites Manager may not be on-site daily, but will make inspection visits to the Site. The Offsites Manager's primary function is to ensure that technical, financial, and scheduling objectives are achieved successfully. The Offsites Manager will communicate with the U.S. EPA Region V OSC on matters concerning the technical aspects and progress of the project. A description of the Offsites Manager's required qualifications, experience and duties are described in Appendix B.

2.4 FIELD TEAM LEADER

The Offsites Manager will be supported by the Field Team Leader. The Field Team Leader is responsible for leading and coordinating the day-to-day activities of the various technical staff under his supervision. They will perform construction inspections and will be responsible for ensuring that construction materials and work conform to the requirements of the Specifications and the QAPP.

2.5 TECHNICAL STAFF

The technical staff (team members) for this project will be drawn from Kerr-McGee's pool of technical employees. The technical team staff will be utilized to gather and analyze data, and to prepare various task reports and support materials. All of the designated technical team possess the degree of specialization and technical competence required to effectively and efficiently perform the required work.

2.6 QUALITY ASSURANCE (QA) SUPERVISOR

The West Chicago Rare Earths Facility (REF) Project QA Supervisor will serve as the Project QA Supervisor on the Lindsay Light II project. He has direct access to corporate executive staff as necessary to resolve any QA dispute. The Project QA Supervisor or his designee will be on-site daily. The Project QA Supervisor is responsible for developing programs and tools to implement and monitor the QAPP and the CQA Plan.

Specific functions and duties of the Project QA Supervisor include:

- Provide QA audit on various phases of the field operations;
- Review and approval of QA plans and procedures;
- Provide QA technical assistance to project staff; and
- Report on the adequacy, status, and effectiveness of the QA program on a regular basis to the Offsites Manager.

2.7 HEALTH AND SAFETY COORDINATOR

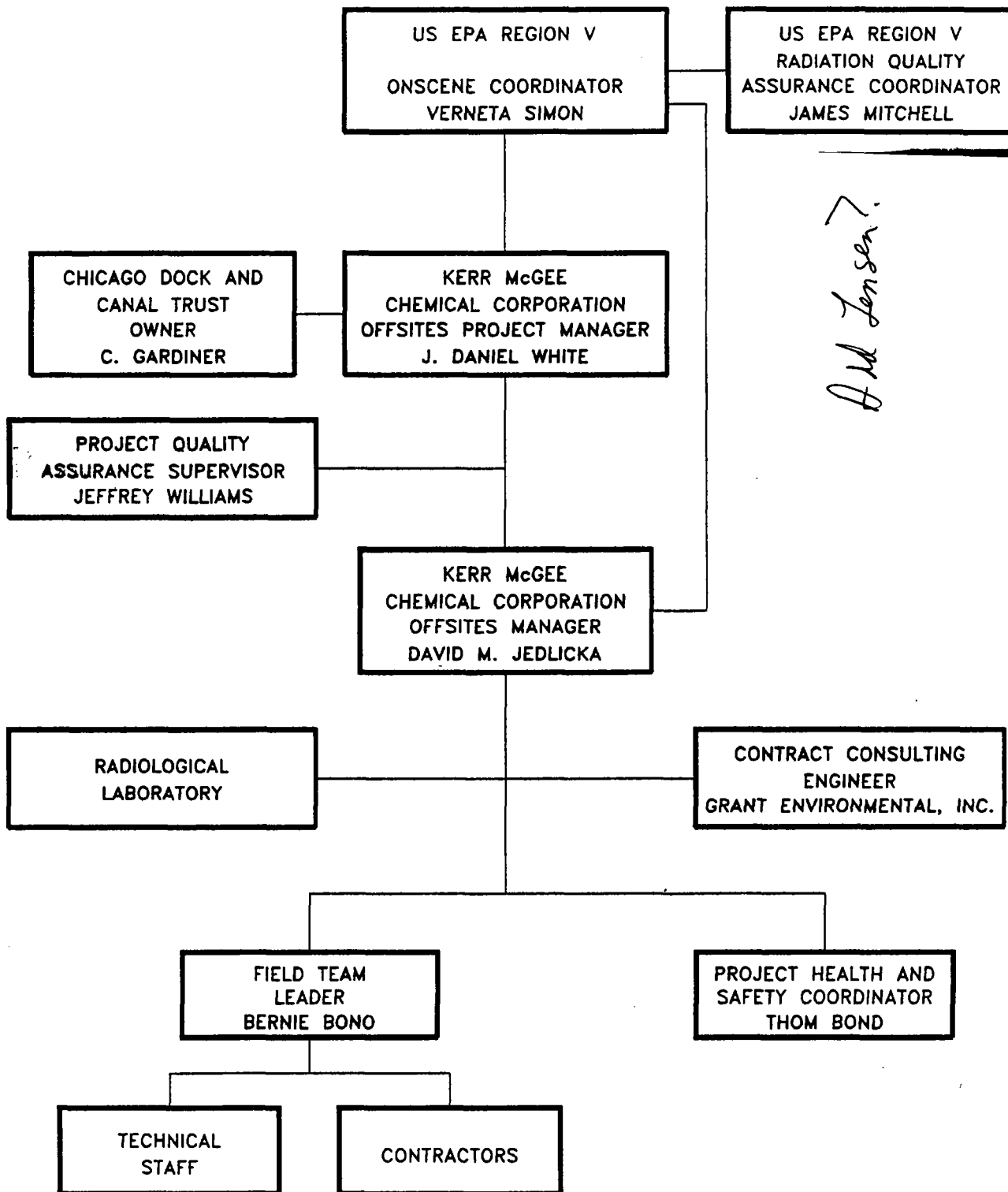
The West Chicago REF Site Safety Specialist will serve as the Project Health and Safety Coordinator (HSC) who is responsible for overseeing implementation of the HASP and advising the Field Team Leader on all aspects of the health and safety ~~onsite~~. The HSC will monitor and maintain quality assurance of the HASP until project completion. Principal duties of the HSC or his designee include reviewing project background data; approving HASP modifications; administering and enforcing the HASP; evaluating the adequacy of personnel protective equipment (PPE) to be used by site personnel; conducting required onsite training except tail-gate safety meetings that will be conducted by the Field Team Leader. The HSC has the authority to stop work in the event conditions develop which pose an unreasonable risk to site personnel or residents.

2.8 U.S. EPA REGION V RADIATION QUALITY ASSURANCE COORDINATOR

The U.S. EPA Region V Radiation Quality Assurance Coordinator has the responsibility to review and provide recommendation for approval to the U.S. EPA OSC.

Add Jensen?

The U.S. EPA Region V Radiation Quality Assurance Coordinator is Mr. James Mitchell.



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FIGURE 2-1
PROJECT ORGANIZATION CHART
LINDSAY LIGHT II SITE
CHICAGO, ILLINOIS

3. QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

The overall QA objective is to develop and implement procedures for field sampling, chain-of-custody, laboratory analysis, and reporting that will provide results that accurately depict the quantities being measured. Specific procedures for sampling, chain-of-custody, laboratory instruments calibration, laboratory analysis, reporting of data, internal quality control, audits, preventive maintenance of field equipment, corrective action, types of quality control checks required (reference samples, controls, blanks, interlaboratory comparison); the frequency of each check; and the quality control acceptance criteria for these checks are described in other sections of this QAPP. Radionuclide analyses of soils by gamma spectroscopy is not amiable to sample surrogate spikes. The purpose of this section is to address the specific objectives for accuracy, precision, completeness, representativeness, and comparability.

3.1 LEVEL OF QUALITY CONTROL EFFORT

Field blank, trip blank, duplicate and matrix spike samples can be analyzed to assess the quality of the data resulting from the field sampling program. Field and trip blanks consisting of distilled water, and submitted to the analytical laboratories, provide the means to assess the quality of the data resulting from the field sampling program. Field blank samples are analyzed to check for procedural contamination at the Site which may cause sample contamination. Trip blanks are used to assess the potential for contamination of samples resulting from contaminant migration during sample shipment and storage. Field and trip blanks will not be utilized during excavation and restoration activities.

The number of duplicate (laboratory split) samples to be collected are listed in Table 3-1. ~~Sampling procedures~~ are specified in the Field Sampling Plan (FSP). The level of QA effort provided by the laboratory will be equivalent to the level of QA effort specified under the Contract Laboratory Program for Routine Analytical Services (RAS) parameters to be tested and the indicated DQO level required.

3.2 ACCURACY, PRECISION, AND SENSITIVITY OF ANALYSIS

The fundamental QA objective with respect to accuracy, precision, and sensitivity of laboratory analytical data is to achieve the QC acceptance criteria of the analytical protocols. Accuracy is a measure of the nearness of a measurement to the true value of the quantity being measured.

Precision is a measure of the closeness to each other of repeated measurements of the same quantity. Duplicate (laboratory split) samples are considered to represent the

same population if analyzed values are within two standard deviations of the population mean. That is:

$$A \pm a\sigma - B \pm b\sigma = 0$$

for some value of "a" and "b" when "a" and "b" range from 0 to 2.

The sensitivities required for radionuclide analyses will be the U.S. NRC reference guideline 4.14.

The Standard Operating Procedures (SOPs) for the field radionuclide screening are outlined in Document 210 of Appendix C. Accuracy and precision requirements for field screening analyses are included in Table 3-2. Sensitivity requirements of equipment are specified in the standard operating procedure describing the equipment. The laboratory's sensitivity for Ra-226 and Ra-228 is summarized on Table 3-3. Tables 3-4 and 3-5 show the minimum detectable limits for TSP by Th-Alpha (gross alpha) and the minimum detectable activity for TSP by gamma spectroscopy, and the minimum detectable levels for gross alpha and gamma spectroscopy, respectively.

3.3 COMPLETENESS, REPRESENTATIVENESS AND COMPARABILITY

COMPLETENESS is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. Following completion of the analytical testing, the percent completeness will be calculated by the following equation:

$$\text{Completeness(\%)} = \frac{\text{number of valid data}}{\text{number of samples collected for each parameter analyzed}} \times 100$$

Data generated by the laboratory has a completeness target of 90 percent.

REPRESENTATIVENESS expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. Representativeness is a qualitative parameter which is dependent upon the proper design of the sampling program and proper laboratory protocol. The sampling network was designed to provide data representative of site conditions. The rationale of the sampling network is discussed in detail in the field sampling plan (FSP). Representativeness will be satisfied by assuring that the FSP is followed, proper sampling technique are used, proper analytical procedure are followed and holding times of the samples are not exceeded in the laboratory. Representativeness will be assessed by the analysis of duplicate (laboratory split) samples.

COMPARABILITY expresses the confidence with which one data set can be compared with another. The extent to which existing and planned analytical data will be comparable depends on the similarity of sampling and analytical methods. The

procedures used to obtain the planned analytical data, as documented in the QAPP, are expected to provide comparable data. These new analytical data, however, may not be directly comparable to existing data because of differences in procedures and QA objectives.

Table 3-1
Summary of Sample Collection and Analysis ^(a)

Purpose	Sample Method	Ra-226 and Ra-228 Analysis	Total Suspended Particulates Analysis	Duplicate(Lab Split) Samples
Air Monitoring	High-Volume Air Monitoring Station	(b) (c)	(b)	0
Backfill Sampling (On-site Source)	Soil Sampling	(d)	-	5%
Backfill Sampling (Offsite Source)	Soil Sampling	(d)	-	5%

(a) Does not include field QC samples.

(b) A minimum of two samples collected from two separate sampling locations per 8 hour period (one day of operation) per property or work area. Filters will be changed daily. TSP analysis procedures are described in Section 5.3 of the Air Monitoring SOP-212.

(c) Air samples will be tested for gross alpha.

(d) Borrow sampling frequency defined in Field Sampling Plan.

Table 3-2

Radiological Laboratory QA Objectives

Purpose	Method	Accuracy	Precision	Completeness %
Ra-226 and Ra-228	Nal Gamma Spectroscopy	+/- 2 σ	+/- 2 σ	90
Ra-226 and Ra-228	HpGe Gamma Spectroscopy	+/- 2 σ	+/- 2 σ	90

Table 3-3

**Minimum Detectable Activity for the On-Site Laboratory Soil Counter
by Gamma Spectroscopy**

Counting Time	Ra-226, pCi/g	Ra-228, pCi/g
2-Minutes	1.40 ± 0.60	1.30 ± 0.56
5-Minutes	0.93 ± 0.40	0.83 ± 0.36
10-Minutes	0.67 ± 0.29	0.62 ± 0.27
20-Minutes	0.61 ± 0.26	0.55 ± 0.24

The on-site laboratory conditions are:

- 20 gram soil placed in a 20-ml polyethylene liquid scintillation counting vial
- Sample counted in a Packard Minaxi system (NaI(Tl) well-type gamma detector)
- Data processed using Kerr-McGee's NUTRANL software
- The standard deviation includes the compounded errors of the analysis
- Minimum Detectable Activity per US-NRC Regulatory Guide 4.14 (at 4.65 times the standard deviation of the analysis for the instrument background).

Table 3-4

Minimum Detectable Limits for TSP (Total Solid Particulates)
by Th-Alpha (Gross-Alpha)

Air Sample Type	Run Time (mins)	Flow Rate (L/min)	Volume (cc)	Alpha BKGD (counts/min)	Alpha MDA (dpm)	Alpha MDA ($\mu\text{Ci/cc}$)	ACL Fraction**
Graseby GMW-2000	10080	1416	1.4E+10	0.3	0.5	4.7E-17	0.002
SAIC AVS-80A	1440	169.9	2.4E+08	0.3	0.5	2.7E-15	0.110
SAIC AVS-60A*	480	198.2	9.5E+07	0.3	0.5	7.0E-15	0.282
Eberline RAS-1	480	45	2.2E+07	0.3	0.5	3.1E-14	1.244

What is ACL?
add column for or at gen. public level

*EMS (Environmental Monitoring Stations) AIR SAMPLER RUNNING AS WORK AREA

**ACL (Alternate Concentration Limit) = $2.49 \text{ E-14 } \mu\text{Ci/ml}$ Th-232 gross alpha equivalent

Air Sample Type	Run Time (mins)	Flow Rate (L/min)	Volume (cc)	Alpha BKGD (counts/min)	Alpha MDA (dpm)	Alpha MDA ($\mu\text{Ci/cc}$)	DAC Fraction***
MSA Flow-Lite	2400	2	4.8E+06	0.4	0.6	1.6E-13	0.036

How DAC?
10 CFR 20 has only 1 digit

***DAC (Derived Air Concentration) = $4.4 \text{ E-12 } \mu\text{Ci/ml}$ Th-232 gross alpha equivalent

NOTE: Above data assumes samples counted on a gas flow proportional counter with an efficiency of 34.1% and a count time of 30 minutes.

Table 3-5

Minimum Detectable Levels for Gross Alpha and Gamma Spectroscopy

Nuclide	MDA, uCi	TSP Volume, ml	MDA, uCi/ml
Pb-210	4.0E-05	9.5E+07	4.2E-13
Pb-212	2.0E-06	9.5E+07	2.1E-14
Pb-214	3.7E-06	9.5E+07	3.9E-14
Bi-212	3.0E-05	9.5E+07	3.2E-13
Bi-214	4.4E-06	9.5E+07	4.6E-14
Ac-228	1.1E-05	9.5E+07	1.2E-13
Th-234	1.1E-05	9.5E+07	1.2E-13
Pa-234m	8.6E-04	9.5E+07	9.1E-12
U-235*	7.3E-06	9.5E+07	7.7E-14

The On-Site Laboratory's operating conditions are:

Air filter counted on 25 % efficiency HPGe detector inside a low background shield.

Sample in poly bag placed directly on top of cryostat.

Counting time of 2.16E+04 seconds (360 minutes or 6 hours).

Data processed using Canberra Procount software.

Minimum Detectable Activity per US-NRC Regulatory Guide 4.14 @ 4.65 times the standard deviation of the instrument background.

- * Contamination only contains naturally occurring uranium and thorium. Therefore, 10 CFR 20 Appendix B MDA for ²³⁵U only applies when dealing with enriched uranium.

*MDA for U-235
higher than 10 CFR -
has to be handled?
when enriched?*

4. SAMPLING PROCEDURES

Sampling procedures are described in Appendix A, Field Sampling Plan (FSP) - Document SOP-201.

5. SAMPLE CUSTODY

It is the U.S. EPA and Region V policy to follow the U.S. EPA Region V sample custody, or chain-of-custody protocols as described in "NEIC Policies and Procedures," EPA-330/9-78DDI-R, Revised June 1985. This custody is divided into three parts: Sample collection, laboratory analysis, and final evidence files. Final evidence files, including all originals of laboratory reports and purge files, are maintained under document control in a secure area.

A sample or evidence file is under your custody if they are in:

- your possession;
- your view, after being in your possession;
- your possession and you place them in a secured location; or
- a designated secure area.

The evidence files for analytical data are maintained at the Kerr-McGee Rare Earths Facility (REF) or at another identified Kerr-McGee facility when the REF closes. As required by Section V.5 of the UAO, Kerr-McGee and all its contractors and agents will preserve all documentation for a minimum of six years following completion of the removal action. The content of the evidence file will include all relevant records, reports, correspondence, logs, field logbooks, laboratory sample preparation and analysis logbooks, data packages, pictures, subcontractor's reports, chain-of-custody records/forms, data review reports, etc. The evidence file will be in the custody of the Kerr-McGee Offsites Project Manager, and kept in a secured area.

6. CALIBRATION PROCEDURES AND FREQUENCY

This section describes procedures for maintaining the accuracy of all the instruments and measuring equipment which are used for conducting tests and laboratory analyses. These instruments and equipment should be calibrated prior to each use or on a scheduled, periodic basis.

6.1 INSTRUMENTS/EQUIPMENT

Instruments and equipment used to gather, generate, or measure environmental data will be calibrated with sufficient frequency and in such a manner that accuracy and reproducibility of results are consistent with the manufacturer's specifications.

Equipment to be used during the sampling will be examined to certify that it is in good operating condition. This includes ensuring that all maintenance requirements are being observed. Notes from previous sampling trips will be reviewed so that any prior equipment problem are not overlooked, and all necessary repairs to equipment have been completed.

Calibration of instruments is governed by the specific Standard Operating Procedure (SOP) for the applicable analysis method, and such procedures take precedence over the following general discussion. All survey instruments used during the excavation and restoration activities shall be calibrated semiannually or when maintenance is required that could affect the calibration. Counters used for air samples shall be checked before use or daily, using calibrated reference sources. Vendor calibration procedures shall be in accordance with the American National Standards Institute (ANSI) N323-1978 and calibration shall be traceable to the National Institute of Standards and Technology (NIST).

6.1.1 Alpha Counters

Alpha counters use an ionizable gas to detect alpha radiation. The instrument measures alpha and beta/gamma present on filter paper. This instrument is checked daily using a reference source. The calibration procedure is described in the applicable Rare Earths Facility Standards Operating Procedures.

6.1.2 Air Pump

Air pumps used to collect air monitoring samples will be calibrated daily.

6.2 CALIBRATION PROCEDURES & FREQUENCY FOR RADIONUCLIDE ANALYSES

Calibration of laboratory equipment will be based on approved written procedures. Records of calibration, repairs, or replacement will be filed and maintained by the designated laboratory personnel performing quality control activities. These records will be filed at the location where the work is performed and will be subject to QA audit.

Calibration and record management procedures are presented in the applicable Rare Earths Facility Standard Operating Procedures.

7. ANALYTICAL PROCEDURES

Soil samples will be analyzed for Ra-226 and Ra-228 by the laboratory. Sample splits will be performed in the laboratory. Kerr-McGee will provide split samples on a routine basis at the request of the U.S. EPA. Air samples will be analyzed for gross alpha. Air samples will not be split.

7.1 RADIOLOGICAL ANALYSIS

Soil samples will be analyzed for Ra-226 and Ra-228 by the laboratory. The on-site laboratory SOPs for radiological analysis of samples will be used for this project. These project-required SOPs are included in the applicable Rare Earths Facility Standard Operating Procedures Section of Appendix C.

7.2 RADIOLOGICAL SCREENING ANALYTICAL PROTOCOLS

The procedures for radiological surveys are described in the Field Sampling Plan.

8. INTERNAL QUALITY CONTROL CHECKS

8.1 FIELD SAMPLE COLLECTION

The assessment of field sampling precision will be made through collection of duplicate (laboratory) splits. The frequency of duplicate sample collection is specified in Section 3 of this QAPP and will be collected in accordance with the applicable procedures described in the Field Sampling Plan. Field collected samples will have enough volume to enable laboratory splits.

8.2 FIELD MEASUREMENT

QC procedures for field measurements are limited to checking the reproducibility of the measurement by obtaining multiple readings on a single sample or standard and by calibrating the instruments. Field radiation survey QC is described in Appendix A.

8.3 LABORATORY ANALYSIS

Two types of quality assurance will be used by the laboratory to ensure the production of analytical data of known and documented usable quality. These types are quality assurance program and quality control checks.

8.3.1 Quality Assurance Program

The REF laboratory at the Kerr-McGee West Chicago Facility has a written Quality Assurance/Quality Control (QA/QC) program which provides rules and guidelines to ensure the reliability and validity of work conducted at the laboratory.

The stated objectives of the laboratory QA/QC program are to:

- ensure that all procedures are documented, including any changes in administrative and/or technical procedures;
- ensure that all analytical procedures are conducted according to sound scientific principles and have been validated;
- monitor the performance of the laboratory by a systematic inspection program and provide for a corrective action as necessary;
- collaborate with other laboratories in establishing quality levels, as appropriate; and
- ensure that all data are properly recorded and archived.

All laboratory procedures are documented in writing as either SOPs or Method Procedures. Internal quality control procedures for analytical services will be conducted in accordance with standard operating procedures and the individual method requirements.

8.3.2 Quality Control Checks

The specifications include the types of Quality Control checks required (reference samples, controls, blanks, interlaboratory comparison), the frequency of each check, and the quality control acceptance criteria for these checks.

The laboratory will document, in each data package provided, that both initial and ongoing instrument and analytical QC functions have been met. Any samples analyzed in non-conformance with the QC criteria will be re-analyzed by the laboratory, if sufficient sample volume is available. It is expected that a sufficient volume of soil will be collected for re-analyses.

9. DATA REDUCTION, VALIDATION, AND REPORTING

9.1 FIELD MEASUREMENTS AND SAMPLE COLLECTION

Raw data from field measurements and sample collection activities will be recorded in a field log book or on the appropriate standard form. Procedures for recording information in a field logbook are included in the Field Logbook SOP (SOP-215) included in Appendix C. Field data that are used in calculations to generate quantitative information, preparation of maps or drawings, or used to quantify data, and the method of reduction will be documented.

9.2 RADIOLOGICAL LABORATORY SERVICES

The laboratory will perform in-house analytical data reduction and validation.

10. PERFORMANCE AND SYSTEM AUDITS

Performance and system audits of both field and laboratory activities will be conducted to verify that sampling and analysis are performed in accordance with the procedures established in the FSP and QAPP. The audits of field and laboratory activities may include two separate, independent parts: internal and external audits. This QAPP provides procedures for those audits that will be conducted by Kerr-McGee.

10.1 FIELD AUDITS

Internal audits of field activities (sampling and measurements) will be conducted by the Kerr-McGee Project Quality Assurance Supervisor. The audits will include, but not be limited to, examination of field sampling records, field instrument operating records, sample collection, handling and packaging in compliance with the established procedures, maintenance of QA procedures, chain-of-custody, etc.

A field audit will take place to determine that personnel are executing required project activities and to verify that all established procedures are being followed. Follow-up audits will be conducted to correct deficiencies, and to verify that QA procedures are maintained throughout the excavation and restoration activities. The audits will involve review of field measurement records, instrumentation calibration records, and sample documentation.

External audits may be conducted by personnel from the U.S. EPA Region V Air and Radiation Division with assistance from U.S. EPA's National Air and Radiation Environmental Laboratory and/or U.S. EPA's Environmental Monitoring Systems Laboratory.

10.2 LABORATORY AUDITS

The internal performance and system audits of the laboratory(ies) will be conducted by a qualified Kerr-McGee auditor.

The system audits, which will be done annually, will include examination of laboratory documentation on sample receiving, sample log-in, sample storage, chain-of-custody procedure, sample preparation and analysis, instrument operating records, etc.

External performance and system audits of the laboratories selected for the project for approval/disapproval may be conducted by personnel from the U.S. EPA Region V Air and Radiation Division with assistance from U.S. EPA's National Air and Radiation Environmental Laboratory and/or U.S. EPA's Environmental Monitoring Systems Laboratory.

10.3 REPORTS

The auditor will prepare a report describing the audit findings. The auditor will review the report with the laboratory and the Offsites Manager, and provide a copy of the audit to the person responsible for that activity. Copies also will be submitted to the Kerr-McGee Offsites Project Manager and placed in the project quality assurance file.

The responsible party will respond to the audit findings, describing the cause of the finding, the remedy to be implemented to cure the deficiency, the actions to be taken to prevent the reoccurrence of the defect, and the schedule according to which these actions will be taken.

When the indicated corrective actions have been completed, the responsible party will notify the auditor. When all findings have been addressed, the auditor will prepare a closing report documenting that the audit findings have been resolved, and that the audit has been closed. This report will be submitted to the Kerr-McGee Offsites Project Manager and placed in the project quality assurance file.

11. PREVENTATIVE MAINTENANCE PROCEDURES

11.1 LABORATORY INSTRUMENTS

As part of the QA/QC Program, a routine preventative maintenance program is conducted by the laboratory to minimize instrument failure and other system malfunctions. The laboratory performs routine scheduled maintenance, and repairs or coordinates with the vendor for the repair of all instruments. All laboratory instruments are maintained in accordance with manufacturer's specifications and the requirements of the specific method employed. This maintenance is carried out on a regular, scheduled basis, and is documented in the laboratory instrument logbook for each instrument. Emergency repair or scheduled manufacturer's maintenance is provided by factory representatives.

12. SPECIFIC ROUTINE PROCEDURES TO ASSESS DATA PRECISION, ACCURACY, AND COMPLETENESS

12.1 FIELD MEASUREMENTS

Field data will be assessed by the Offsites Manager or his designee. He will review the field results for compliance with the established QC criteria that are specified in the QAPP and FSP. Accuracy of the field measurements will be assessed daily according to the manufacturers recommendations. Precision will be assessed on the basis of reproducibility by multiple reading of a single sample.

12.2 LABORATORY DATA

Laboratory results will be assessed for compliance with required accuracy and completeness as described in the following sections.

12.2.1 Accuracy

Accuracy of laboratory results will be assessed for compliance with the established QC criteria that are described in Section 3.2 of this QAPP.

12.2.2 Completeness

The data completeness of laboratory analysis results will be assessed for compliance with the amount of data required for decision making. The completeness is calculated using the following equation:

$$\text{Completeness (\%)} = \frac{\text{Valid Data Obtained}}{\text{Total Data Planned}} \times 100$$

12.2.3 Validation

Data will be validated at each step of collection, reduction, and reporting. This will include validation of the following:

- Laboratory validation of data will follow standard operating procedures. Laboratory validation of data will consist of monitoring the variations in the accuracy and precision of routine analytical procedures through the use of recovery values and blanks. Data that do not meet validation criteria will be identified by the laboratory when the data report is issued.
- Field data validation will follow standardized data collection procedures, including calibration procedures will be used. Each person assigned to each data

collection task is responsible for understanding and employing the standard procedures to be used. Field data collected will be recorded on appropriate data collection forms or a field notebook.

- Laboratory data received from analytical and soil laboratories will be reviewed by the person for obvious discrepancies. The data validation process will include an assessment of holding-time compliance, laboratory instrument tuning and performance, calibration procedures, results of calibration, and results of equipment, travel, and method blanks.
- Calculations include data manipulations made that can be checked and that are made in conjunction with the analysis or interpretation of data, engineering design, cost estimate, or any other related activity. Calculations will be reviewed according to the applicable procedures in this document.
- Upon receipt of data reports from the laboratories, data will be reviewed for obvious discrepancies. After screening, the data will be entered into the appropriate database. After data entry, the entries will be printed and checked against the original data. Errors will be corrected and the corrections verified by checking against the original data.

13. NONCONFORMANCE AND CORRECTIVE/PREVENTIVE ACTION

13.1 CONTROL OF NONCONFORMING PRODUCT

Kerr-McGee maintains procedures which ensure that critical materials, products, services, or other items which do not conform to specified requirements are not inadvertently used, installed, or shipped. Nonconforming critical materials are clearly identified and segregated to await evaluation and final disposition.

Each nonconformance is documented, identified, and described, with a recommendation for disposition. Reworked, repaired, and replacement items are inspected and tested against original inspection and test requirements. The quality assurance system contains procedures to assure that reworked, repaired, and replaced items do not lose their identity and are not inadvertently used or installed (Kerr-McGee Quality System Procedure Number 14). Rejected or scrapped materials are disposed of effectively and efficiently. Final disposition is approved by the Offsites Manager, or designee.

13.2 CORRECTIVE AND PREVENTIVE ACTION

Kerr-McGee's quality assurance system employs corrective and preventive action to correct and eliminate root causes of problems which are systemic and/or repetitive, or which could occur at a future time. When solutions require changes to the quality system and its documentation, those changes are recorded and captured within the document control system.

13.2.1 Corrective Action

Corrective action is necessary to remedy nonconformities that occur in the Quality Assurance System. Nonconformities can be reported by the Customer, by any supplier, or by a contractor. Nonconformities discovered during internal and third party audits are reported as Corrective Action Requests as described in Quality System Procedure Number 10. Nonconformities are reported per Quality System Procedure Number 9. Corrective action includes:

- Identification of observed nonconformances in supplied product, services, operations, or output product;
- Investigation of the discrepancy;
- Determination of the cause;
- Initiation of actions to correct the nonconformance to a degree appropriate to the magnitude of problems and commensurate with the risks encountered;

- Evaluation of the effectiveness of the corrective action in preventing recurrence; and
- Changing the system and system documentation when necessary.

Responsibility for corrective action is determined organizationally by the area affected. The Offsites Manager, or designee, approves all corrective action and periodically reviews corrective action to verify effectiveness. Corrective action involving a Kerr-McGee supplier or contractor requires that supplier or contractor to provide the following information:

- Description of factors contributing to the deficiency; and
- Description of the remedy to correct the nonconformance.

Conditions adverse to quality, safety, reliability, or performance are documented and reported to appropriate management for corrective action.

13.2.2 Preventive Action

Where corrective action is necessary to eliminate a nonconformance or correct a deficiency within the quality assurance system, preventive action is taken to discover and eliminate potential nonconformance. Preventive action includes:

- Periodically reviewing work operations, audit results, quality records, service reports, and customer complaints to detect and eliminate potential causes of nonconformities;
- Discovery and evaluation of alternative solutions to prevent nonconformance to a level corresponding to the risks encountered;
- Implementation of an appropriate solution alternative;
- Evaluation of the effectiveness of the preventive action to prevent recurrence;
- Changing the system and system documentation when necessary;
- Assuring that Management reviews all preventive actions; and
- Establishing procedures to assure that the preventive action process occurs continually.

Responsibility for preventive action is the same as for corrective action discussed above.

13.3 SAMPLE COLLECTION/FIELD MEASUREMENTS

All project personnel will be responsible for reporting all suspected technical or QA nonconformances or suspected deficiencies of any activity or issued document to the Offsites Manager or designee. The Offsites Manager will be responsible for assessing the suspected problems. The assessment will be based upon the potential for the situation to impact the quality of the product. If it is determined that the situation warrants a reportable nonconformance requiring corrective action, then a nonconformance report will be initiated by the Field Team Leader.

The Offsites Manager will be responsible for ensuring that corrective action for nonconformances are initiated by:

- evaluating all reported nonconformances,
- controlling additional work on nonconforming items,
- determining disposition or action to be taken,
- maintaining a log of nonconformances,
- reviewing nonconformance reports and corrective actions taken, and
- ensuring nonconformance reports are included in the final site documentation in project files.

If appropriate, the Offsites Manager will ensure that no additional work that is dependent on the nonconforming activity is performed until the corrective actions are completed.

When it becomes necessary to modify a program, the responsible person notifies the Offsites Manager of the anticipated change and implements the necessary changes after obtaining the approval of the Offsites Manager per the Interim Change Notice Procedure (SOP-LLII 103). The change in the program will be documented on the field change request that will be signed by the initiators and the Field Team Leader. The field change request for each document will be numbered serially as required. The field change request shall be attached to the file copy of the affected document. The Offsites Manager must approve the change in writing or verbally prior to field implementation, if feasible. If unacceptable, the action taken during the period of deviation will be evaluated in order to determine the significance of any departure from established program practices and action taken.

The Offsites Manager for the Site is responsible for controlling, tracking, and implementation of the identified changes. Reports on all changes will be prepared by the Offsites Project Manager and distributed to all affected parties which include the

U.S. EPA OSC. The U.S. EPA OSC will be notified whenever program changes in the field are made.

13.4 LABORATORY CORRECTIVE ACTION

Implementation of corrective actions for the laboratory will be the responsibility of the laboratory personnel.

14. QUALITY ASSURANCE REPORTS TO MANAGEMENT

In addition to the audit reports submitted to the Offsites Project Manager in accordance with QAPP Section 10, a report summarizing QA activities and issues will be included with the final Excavation and Restoration Report. This report will be an attachment to the final Excavation and Restoration Report and will contain QA sections that summarize data quality information collected during the project.

The QA activities report in the final Excavation and Restoration Report will be a written report produced by Kerr-McGee and will contain the following information:

- changes in QAPP;
- summary of QA/QC programs, training and accomplishments;
- results of technical systems and performance evaluation audits;
- significant QA/QC problems, recommended solutions, and results of corrective actions;
- data quality assessment in terms of precision, accuracy, representativeness, completeness, comparability, and method detection limit;
- indication of whether the QA objectives were met; and
- limitations on use of the measurement data.

LINDSAY LIGHT II PROJECT

Field Sampling Plan

Appendix A

Title: Field Sampling Plan

Document Number: 201

Revision Number: 0

Approved By:

Date: July 25, 1996

Replaces: None

FIELD SAMPLING PLAN

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1. INTRODUCTION

This Field Sampling Plan (FSP) describes the quality-related sampling activities that will be implemented during the excavation and restoration activities at the Lindsay Light II Site (Site), located in Chicago, Illinois.

Samples will be collected under the Quality Assurance Project Plan (QAPP) for the following limited aspects of the work:

- 1) Air monitoring.
- 2) Sampling backfill soil material to ensure that the material used to restore excavations is clean, that is, that the radiological composition of the backfill material must be within background range.
- 3) Local background will be established for total radium (Ra-226 and Ra-228) from four soil samples taken at the Site at points where gamma exposure rates are lowest plus eight soil samples taken off-site, but in the immediate vicinity of the Site.
- 4) Verification sampling to ensure that contaminants which were present above the cleanup criteria have been removed.

The U.S. EPA identified the constituents of concern as the entire thorium 232 and uranium 238 decay chains, including radium-226 and radium-228. This sampling program includes monitoring only for total radium (Ra-226 and Ra-228) in accordance with the Unilateral Administrative Order (UAO).

This FSP describes the basis for the backfill, air monitoring, establishing background and verification sampling programs. It describes sample locations, field sampling and surveying, field instruments, decontamination, and sample management that will comprise the quality-related excavation/restoration sampling.

Field sampling activities described in this plan include the following:

- Soil sampling for laboratory analysis of radioactive constituents of concern for both backfill soils and to establish local background;
- Air sampling (filter paper) for laboratory analysis of radiological constituents of concern;
- Verification sampling to ensure removal of contamination above the cleanup criteria.

- On-site management of samples:
- Decontamination: and
- Analytical programs.

The FSP specifies techniques, equipment, and procedures for each activity, number and type of sample, and contingencies that may be implemented during the excavation and restoration activities. Standard Operating Procedures (SOPs) that will be followed in the sampling and analyses are included in Appendix C of the QAPP.

2. SAMPLE NETWORK AND RATIONALE

This section describes the sampling collection programs and the bases upon which the programs have been developed.

2.1 SAMPLING OBJECTIVES

The objectives of the air sampling program described in this plan are to collect sufficient background air samples and air samples during soil excavation to assure that excessive airborne contaminated dust is not being released. Air monitoring activities will be conducted within excavated areas to monitor personnel exposures, and at the perimeter of the work areas to monitor releases to the uncontrolled environment.

The objectives of the soil sampling program described in this plan are to assure that soil used as backfill is clean. Other tests will be completed on the soil backfill to measure its fitness for backfill, but these tests are not quality-related, and are not described in this plan.

The objectives of the verification sampling program are to ensure that all contamination in excess of the cleanup criteria has been removed. Gamma screening and specific soil testing will be conducted, and the results reported to the U.S. EPA. A complete description of the verification sampling program is included in the specifications attached to the CQA Plan.

The following types of samples will be collected at the Site:

Air Samples

The following air samples will be taken during excavation activities:

- High-volume particulate air samples (for radioactivity) from restricted-area perimeter monitoring stations; and
- Samples from personal samplers (for radioactivity and dust).

Background Samples

- Local background will be established for total radium (Ra-226 and Ra-228) from four soil samples taken at the Site at points where gamma exposure rates are lowest plus eight soil samples taken off-site, but in the immediate vicinity of the Site.

Describe why air sample plan have it?

Earlier soil high or low vol.

Backfill Samples

The type and number of backfill samples obtained to ensure that the material is clean depends upon the source area of the material. Backfill may be obtained from on-site sources or off-site sources. On-site backfill comprises clean soil that was removed to allow access to contaminated soil. Off-site backfill comprises soil obtained from sources remote from the Site. Off-site soil will be obtained only from confirmed uncontaminated sources.

The sampling programs for each type of soil used in site remediation are described in the following sections.

On-site Backfill Material

On-site soil that may be used for backfill will be separated as it is excavated, and sampled before it used as backfill. This sampling will be done concurrent with or immediately after the material is excavated to determine whether the soil meets the background radiological criterion. This sampling will be conducted in accordance with SOP-214, Soil Sampling. On-site backfill soil will be used for the type of backfill from which it was excavated. That is, excavated topsoil will be used for topsoil backfill, and excavated subsoil will be used for subsoil backfill. It is assumed that soils excavated from a site were suitable for the uses to which the Site might be put, so on-site backfill will not be tested for geotechnical or agricultural properties.

Where excavations extend below engineered structures such as pavement base material or similar controlled fill material, the excavated soils will not be used to replace the engineered fill. Instead, the backfill used to replace the engineered fill will be obtained from off-site sources, and will meet the applicable requirements of the appropriate governmental entity or utility.

Soil samples and measurements for radiological analyses will be taken to qualify on-site soils for use as backfill. The samples will be tested according to the procedures described in the QAPP.

Off-site Backfill Material

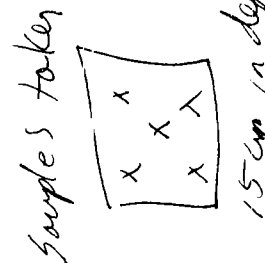
Off-site backfill sources will be qualified before soils from the source are brought to the site. The qualification testing will include sampling and testing in-situ soils or soil stockpiles for radiological properties. Soil samples for laboratory analysis of radioactive constituents of concern will be taken from the candidate soil sources. One sample will be taken from each borrow source for each 10,000 cubic yards of soil brought to the Site. At least one sample will be taken from each off-site source.

Soils intended to be used for structural or common backfill will be tested to measure their geotechnical properties. Soils intended to be used for topsoil will be tested to measure their agricultural properties and will be described accordingly to the Unified Soil Classification System. These tests are not quality-related, and are not described in

this plan. A description of the testing to determine the geotechnical and agricultural properties of the soil is included in the Specifications that are a part of the CQA Plan.

Verification Samples

The samples will be collected in accordance with the Soil Sampling Procedure (SOP-214) and the Verification Sampling Plan (Appendix F of the Work Plan). One composite of five soil samples, ~~1~~ 4 to 6 inches in depth will be collected and analyzed for each 100 m², or less, of excavated area.



2.2 SAMPLE TYPE, LOCATION AND QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

2.2.1 Air Monitoring

The air monitoring program is described in detail in the Air Monitoring Plan, Appendix B to the Work Plan.

High-volume or low-volume air samples will be obtained from perimeter monitoring stations located around the remediation areas.

Air samples will be collected during excavation activities to determine the presence of airborne radioactivity particulates.

Air samples will be collected in accordance with the procedures in Section 11.5 of Kerr McGee's Radiation Protection Manual. The air sampling procedure is included as SOP-212 in Appendix C to the QAPP.

Air monitoring will be established before the excavation begins. High-volume and low-volume air samplers collect ambient air particulates on filters for subsequent counting. Air monitoring locations generally will be located downwind from the excavation area. Two air monitoring stations will be used at the Site.

2.2.2 Background Sampling

Local background will be established for total radium (Ra-226 and Ra-228) from four soil samples taken at the Site at points where gamma exposure rates are lowest plus eight soil samples taken off-site, but in the immediate vicinity of the Site.

2.2.3 Backfill Sampling (On-Site Source)

As practical, uncontaminated soil will be kept separate from contaminated soil during excavation. Uncontaminated soil will be returned to the original excavation whenever possible.

To ensure that the excavated material is not contaminated, a sampling program has been developed for testing on-site backfill material. The program consists of gamma

surveys and soil sampling to measure radioactive constituents of concern concentrations in the soil.

Potentially-clean soils may be separated at the Site during excavation. If the volume of clean material that is required to be excavated is small, the Field Team Leader may elect to remove this material and dispose of it as contaminated material. If a sufficient volume of material is separated during excavation, the clean soil will be stockpiled in a clean area and protected from becoming contaminated. In this case, potentially-clean soils will be separated into categories depending upon the potential ultimate use of the soil. Soil intended to be used for topsoil will be separated from soil intended to be used for common or structural fill. Other stockpiles may be maintained if, for example, some soil or debris is scheduled to be transported to appropriate non-hazardous landfills. All soil will be managed as if it were contaminated until testing shows otherwise.

On-site soils considered for backfill will be tested in accordance with SOP-214, Soil Sampling.

2.2.4 Backfill Sampling (Off-Site Source)

Backfill soils obtained from off-site locations will be obtained from locations thought to be uncontaminated. Consequently, less-intense sampling is contemplated to demonstrate compliance of off-site soils with backfill criteria than is proposed for demonstrating compliance of on-site backfill soils.

Sampling of potential off-site borrow soils will be conducted in accordance this Field Sampling Plan. Samples from off-site borrow sources will be obtained for every 10,000 cubic yards of borrow soil used. A minimum of one sample will be obtained for each borrow source.

2.2.5 Verification Sampling

The verification sampling program is described in detail in the Verification Survey Procedure (SOP-LLII 223).

Verification sampling is intended to be confirmatory to the verification gamma scan. Laboratory analyses of composite samples, each composite representing an excavated area of 100 m², shall be used to confirm that the cleanup criteria were achieved.

5 Sample
Composite

3. SAMPLE MANAGEMENT PROCEDURES

3.1 FIELD ACTIVITY DOCUMENTATION

Field logbooks will be used to document daily field activities in accordance to Section 5 of the QAPP. Field logbook documentation procedures are in SOP-215 in Appendix C of this QAPP.

3.2 SAMPLE IDENTIFICATION

All samples collected at the Site will be identified according to the Soil Sampling Procedure (SOP-214).

3.3 SAMPLE CONTAINERS

Sample containers have been selected based on the sample matrix and requirements of the analytical methods. Suitable containers used during the excavation and restoration activities include:

Air Monitoring Station Sampling

- Envelopes of suitable size for glass fiber filters.

Soil Sampling

- Plastic bottles or plastic bags of suitable size for soil samples.

3.4 SAMPLE PRESERVATION

Soil samples to be tested for radioactivity do not require preservation.

3.5 SAMPLE HOLDING TIME

All initial radiological analysis will be performed within six months from the date the sample was collected.

3.6 SAMPLE LABELS

Each container will be labeled with the following minimum information:

- Date and time of sample;
- Unique sample number;
- Sample volume (air samples);

- Project identification; and
- Name of sampler.

Other information such as weather conditions, sample analysis, and sample preservation may be included on the sample label, as appropriate.

4. DECONTAMINATION

All discarded materials, waste materials, and other field equipment and supplies will be handled in such a way to prevent the potential spread of contamination during excavation activities. Discarded items that have contacted contaminated materials will be containerized and transported to the approved disposal facility. Non-contaminated discarded items will be collected, bagged, and placed in dumpsters for disposal at an approved landfill.

4.1 PERSONNEL DECONTAMINATION

The following procedure will be implemented for personnel decontamination when work activities are conducted in contaminated areas:

1. Remove respirator, if applicable;
2. Remove disposable boots and gloves and discard;
3. Remove coveralls and discard;
4. Perform personal radiation survey; and,
5. Sanitize respirator, if applicable.

4.2 EQUIPMENT DECONTAMINATION

All sampling equipment will be wiped clean of soil and dust between each use when work activities are conducted in contaminated areas:

4.3 CONTAINER AND SHIPPING CONTAINER DECONTAMINATION

The following general procedure for decontamination of sample containers and shipment packages will be followed:

1. Seal container or shipping package;
2. Wipe container or shipping package with paper and tap water;
3. Allow to air dry; and
4. Perform radiation release survey.

LINDSAY LIGHT II PROJECT

Job Descriptions

Appendix B

Title: Job Descriptions

Document Number: 202

Revision Number: 0

Approved By:

Date: July 25, 1996

Replaces: None

POSITION DESCRIPTIONS

OFFSITES PROJECT MANAGER

Qualifications

Degree in Engineering, Law, Construction, Chemistry, Health Physics or related technical discipline.

Ability to manage multiple sites and/or contracts requiring the coordination of multiple crews and disciplines.

*Submit permits +
level of personnel
before starting*

Experience

Ten years progressively more responsible experience in management of multiple-site projects, with direct experience in negotiating with regulatory agencies.

Duties

Approve all external reports before their submission to the U.S. EPA.

Develop mechanisms to review and evaluate task products with respect to planned requirements, work orders and authorizations. Major responsibilities will include performing reviews of checklists prepared by the Field Team Leader and the Offsites Manager and cross-checking to ensure all necessary permits and testing have been done and filed, reviewing daily reports, reviewing files to determine work is properly documented, and working with the Offsites Manager to negotiate changes to standard procedures.

Acquire and provide technical and corporate resources as needed to ensure performance within budget and schedule constraints.

Main point of contact with regulatory agencies and the public. Represent the project team at meetings and public hearings.

Be responsible for the preparation and quality of interim and final reports.

OFFSITES MANAGER

Qualifications

Degree in Engineering, Construction Management, Chemistry, Health Physics, or related technical discipline.

Ability to plan and to provide hands-on management of multiple sites requiring the coordination of multiple crews and disciplines.

Sufficient background and experience in remediation and low-level radioactive waste work to plan and manage field activities.

Experience

Five years experience in low-level radioactive waste, mining, or construction. At least two years at project level is desirable.

Two years of experience with remediation or waste management projects is desirable.

Duties

Approve all external reports before their submission to the Offsites Project Manager.

Evaluate preliminary data to estimate time and needs for additional investigations and evaluate additional data to estimate time, needs and costs for surveying, excavation and restoration work.

Provide general guidance to the Field Team Leader for properly completing the work, and provide specific guidance for problems which arise during excavation and restoration activities.

Prepare and modify the master project schedule and cost estimate. Work directly with Offsites Project Manager on describing and justifying, as necessary, modifications to the schedule and costs.

Communicate with U.S. EPA personnel on matters concerning the technical aspects and progress of the project. Make formal requests to the U.S. EPA when work is ready for verification testing or agency inspection.

Be responsible for the preparation and technical quality of interim and final reports.

FIELD TEAM LEADER

Qualifications

Degree or sufficient applicable experience in Engineering, Construction Management, Chemistry, or a related technical discipline with experience as described below.

Able to plan and provide hands-on management of construction projects requiring the coordination of several crews and disciplines.

Able to read and understand construction drawings and specifications and convey such information to construction personnel.

Background in general construction work with experience in remediation and low-level radioactive waste work.

Familiar with testing equipment and procedures applicable to site work (e.g. asphalt, concrete, etc.).

Experience

At least five years experience in construction or waste management. At least one year should have been as supervisor where responsibilities included materials, labor and cost estimating, scheduling of work, and supervision of four-man or larger crews.

At least two years of experience with remediation or waste management projects. Projects must have included earthwork, demolition, and restoration work, with multiple crews and coincidental tasks.

Duties

Coordination and management of field staff including surveying, excavating, sampling and restoration. Contact the Offsites Manager and the Offsites Project Manager if any changes to the approved work order or the specifications are necessary.

Preparation of the Work Order for Site, including: confirming estimates of extent of contamination; selecting, as necessary, locations for decontamination facilities, runoff controls, stockpile areas and staging areas (where equipment, materials, etc. will be put during the day or if left overnight); and determining starting points and direction(s) of excavation.

Provide day-to-day direction for the excavation and restoration work at the Site.

Work with the appropriate technical staff to determine if excavation has been properly completed.

Review test result sheets supplied by the laboratories, subcontractors, and construction personnel (such as the pre-verification radiological testing by the Radiological Technicians).

Work with the subcontractor's QC testing personnel to ensure all required testing is properly done and documented, and review specifications as necessary prior to and during the work to ensure all work is properly done and documented.

Prepare daily construction reports describing the work completed, any testing, the results of monitoring at the Site, and any problems or unusual conditions which occurred and their resolution.

PROJECT QUALITY ASSURANCE SUPERVISOR

Qualifications

Degree in Engineering, Construction Management, Chemistry, or a related technical discipline with at least five years experience as described below.

Able to summarize quality assurance and quality control requirements from these plans, develop and implement a program to implement and verify that the requirements are met.

Able to develop and conduct training classes for the various aspects of project quality assurance and quality control.

Background in project management in engineering design, project management, or quality assurance as applied to complex engineering projects.

Familiarity with quality assurance, quality control, and management of construction projects requiring scheduling and documentation of diverse tasks over a substantial construction period.

Experience

At least five years in engineering design, engineering construction, or construction project management with at least one year of experience with environmental projects. Project management experience should include management of earthwork, demolition, and restoration work.

Duties

The principal responsibility of the Project Quality Assurance Supervisor is to implement ~~and monitor compliance~~ with established quality assurance program. This includes developing and supervising programs to implement quality assurance, to monitor the quality controls used for compliance with these programs, and to work with other project management personnel to identify and correct areas of non-compliance.

Quality Assurance implementation for the Lindsay Light II Site project includes:

- developing and implementing a quality assurance program that governs quality controls application to project activities.
- developing audit, checklists, schedules, corrective actions tracking and other tools to summarize and manage the quality assurance and quality control requirements.
- developing, scheduling, and conducting training sessions to familiarize project personnel with applicable quality requirements.

- **coordinate and scheduling a program of announced and unannounced audits of project activities and project records.**
- **conducting or leading announced and unannounced quality audits as required by the audit plan.**
- **assisting Project Management in identifying and resolving areas of non-compliance with the QAPP, the CQA Plan, or the Specifications.**
- **reporting the status of quality assurance and quality control compliance to Project Management Personnel according to the quality assurance implementation plan.**
- **reviewing submittals as requested by project management.**
- **making site visits and inspecting the construction site to review the work in progress, the completed work, and plans for future work.**
- **reviewing the test results supplied by the laboratories, subcontractors, and construction personnel to verify the completeness of the reports.**

HEALTH AND SAFETY COORDINATOR

Qualifications:

Degree or sufficient applicable experience in Occupational Health, Public Health, Medicine, or related field.

Ability to manage subordinate health and safety personnel on complex projects.

Experience:

At least five years experience in overseeing health and safety aspects of complex or multiple-site projects, including experience with health and safety matters regarding radioactivity, including radiation training, radiation experience, and health physics experience.

Duties:

Advises the Field Team Leader on all aspects of health and safety on site.

Administration of the Project Health and Safety Program.

Oversees or conducts periodic inspection of workers and work areas.

Plans and oversees or conducts site training/orientation and daily health and safety meetings.

Oversees or selects and periodically inspects protective clothing and equipment.

Oversees or conducts monitoring for on-site noise hazards and the use of hearing protection.

~~Approves storage~~ and maintenance of protective clothing and equipment.

Oversees monitoring work parties for signs of stress, such as cold exposure, heat stress, and fatigue.

Oversees monitoring for on-site hazards and conditions.

Conducts periodic reviews to determine if the Site Health and Safety Plan is being followed.

Establishes emergency procedures, evacuation routes, and maintains the list of telephone numbers for the ambulance, local hospital, poison control center, fire department, and police department.

Participates in accident/incident investigations and prepares accident reports for Management.

RADIOLOGICAL TECHNICIAN

Qualifications:

Sufficient applicable experience in health physics and radiological monitoring.

Experience:

At least five years experience as a radiological technician, and experience with remediation projects.

Duties:

Provide day-to-day radiological monitoring of air and soil. Collect air and soil samples. Perform initial and verification surveys. Operate on-site laboratory. Ensure workers comply with regulatory requirements and that radiological controls protect the environment.

Assist Field Team Leader as required with other aspects of the project including but not limited to inspection, health and safety, field logbook entries, and reporting.

LINDSAY LIGHT II PROJECT
Standard Operating Procedures
Appendix C

Title: Standard Operating Procedures

Document Number: 203

Revision Number: 0

Approved By:

Date: July 25, 1996

Replaces: None

APPENDIX C STANDARD OPERATING PROCEDURES

The following is a list of the standard operating procedures for the Lindsay Light II Site.

Gamma Radiological Survey SOP
Document 210

Air Monitoring SOP
Document 212

Soil Sampling SOP
Document 214

Field Logbook SOP
Document 215

Work Order Development SOP
Document 216

Excavation SOP
Document 217

Borrow Sampling SOP
Document 220

Verification Survey SOP
Document 223

REF Facility Procedures (Refer to the index sheet for list of applicable Rare Earths Facility Standard Operating Procedures included in this appendix).

LINDSAY LIGHT II PROJECT

Gamma Radiological Surveys

Title: Gamma Radiological Surveys

Document Number: SOP-210

Revision Number: 0

Approved By:

Date: July 25, 1996

Replaces: None

1. PURPOSE

This procedure provides protocols for gamma radiological surveys.

2. SCOPE

Radiological surveys will be performed at the designated Lindsay Light II Site as part of the pre-excavation, excavation, and verification surveying program.

3. REFERENCES

3.1 None.

4. EQUIPMENT AND MATERIALS

- 4.1 Trimble Pathfinder Pro XL 4.1 GPS (Optional).
- 4.2 2-inch by 2-inch NaI (T1) gamma detector.
- 4.3 Ludlum Model 2221 portable scaler ratemeter analyzer.

5. INSTRUCTIONS FOR RADIOLOGICAL SURVEY

- 5.1 Land Survey Procedure
 - 5.1.1 Two perpendicular baselines will be established.

5.1.2 A grid along the baseline will be established using cloth or steel tape and a compass, if necessary. Stakes, survey flags, or paint will be placed as needed to delineate grid or traverse lines. The grids will be spaced between one-half and one meter apart.

5.1.3 The baseline, permanent structures, areas of remediation, and other areas of interest will be illustrated in the field logbook.

5.2 Gamma Survey Procedure

5.2.1 The Ludlum ratemeter is set for 2-second time-weighted average count rate.

5.2.2 Hold the survey meter probe parallel to the ground surface at a height of approximately two to six inches.

5.2.3 Walk along grid lines at a maximum speed of about 0.5 meters per second (1 mile per hour).

5.2.4 Continue surveying until all survey grids have been traversed.

5.3. Radiological Survey of On-Site Materials

5.3.1 Material that is excavated and placed in the clean stockpile will be surveyed two times. The first survey will be performed prior to excavation activities.

5.3.2 The second survey will be performed during the excavation of the non-contaminated soil.

The soils will be surveyed before they are placed in the stockpile. Based on the gamma scan, the material will either be designated as contaminated material and immediately loaded for transportation and disposal or tentatively designated as clean and stockpiled for subsequent soil sampling per SOP-214.

5.4. Daily Surveys

5.4.1 Routine daily surveys shall be performed for each day of operations at the site.

5.4.2 The routine surveys will monitor areas in the immediate vicinity of excavations and along soil movement paths to ensure that radiation levels are not affected by activities.

5.4.3 Routine surveys shall be documented by preparing a drawing of the survey results in the field logbook, indicating either the location

and value of individual measurements, or contours of the measured gamma field.

- 5.4.4 Surveys of excavation areas will be made at the request of the Field Team Leader to assess the progress of the removal. These surveys will not be documented, but will be used by the Field Team Leader to manage the excavation.

5.5 Verification Survey

- 5.5.1 A Verification Survey shall be performed to ensure that the excavation was decontaminated.
- 5.5.2 The survey is conducted at the same time as the excavation work. The survey method is performed as specified in section 5.1 and 5.2. Upon completion of the survey and excavation phase, a "Notification of Successful Verification" is sent to the U.S. EPA.

LINDSAY LIGHT II PROJECT

Air Monitoring Procedure

Title: Air Monitoring Procedure

Document Number: SOP-212

Revision Number: 0

Approved By:

Date: July 25, 1996

Replaces: None

1. PURPOSE

This procedure describes the methods to be used for sampling and measurement of airborne radioactive materials. The measurement data will be used to evaluate the effectiveness of health and safety measures at the work site. Controls will be established as necessary based upon the measurements to ensure regulatory compliance and appropriate protective measures for workers and the public.

2. SCOPE

This procedure applies to field activities that may generate dust or airborne emission from the site.

The Respondents will establish background environmental monitoring stations to measure background air quality in the area. Information from these stations will be interpreted to be representative of area-wide background air quality.

Where by Stations?

3. REFERENCES

- 3.1 Code of Federal Regulations, Title 10, Part 20, Standards for Protection Against Radiation.
- 3.2 IAC application (page 6-2 of environmental analysis).

4. EQUIPMENT AND MATERIALS

- 4.1 Environmental Monitoring Stations (EMS)
- 4.2 Alpha Counter (Ludlum Model 2000 Scaler with a 43-10 scintillation detector or equivalent).
- 4.3 Low-Level Alpha Counter (Gamma Products G5000 or equivalent).
- 4.4 Air Monitoring Report, Form SOP 212-1.

5. INSTRUCTIONS

5.1 Air Monitoring Locations

- 5.1.1 Two air monitoring stations shall be used during the excavation activities.
- 5.1.3 High volume air samples generally will be located downwind from the excavations and at the boundary of the Site.

Workers will wear personal air monitors to evaluate the air quality at the worker's breathing zone. The work area air samples are intended to monitor the amount of contaminants leaving the site and the personal air monitors are intended to monitor a workers exposure.

5.2 Air Sampling Requirements

- 5.2.1 Air shall be drawn into the sample at a height between 1 and 2 meters above the ground.
- 5.2.2 The minimum detectable activity (MDA), measured in $\mu\text{Ci/ml}$, shall be re-established following equipment modification or replacement.

The two Gamma Products G5000 systems are the primary counters used for alpha counting. The Ludlum Model 2000 Scaler with a 43-10 is used only for backup in the event both G5000 systems are down for repair. The alpha counting effectiveness and MDAs for the G5000 and Ludlum systems are similar.

- 5.2.3 Work area air samples filters shall be collected at least daily during excavation activities.
- 5.2.4 Flow rate through samples should be between 4 and 6 cubic feet per minute (cfm).

5.4 Radiological Analysis

5.4.1 Radiological analysis shall be performed in accordance with the West Chicago Facility Quality System procedures.

5.4.2 Samples will be analyzed for gross alpha concentration. Air filters are counted for 30 minutes for Th-alpha and three minutes for Pb-212.

5.4.2.1 A five-hour minimum waiting period from the time of collection to the time of counting will be observed to allow decay of short-lived uranium progeny and ingrowth of short-lived thorium progeny.

5.4.3 Contribution of site activities to airborne radioactivity shall be determined as follows:

5.4.3.1 The net counts are divided by the counter efficiency and volume of the sample to obtain the air concentration.

5.4.3.2 The air concentration will be compared to the most limiting effluent concentration limit for Thorium-232 (4×10^{-15} $\mu\text{Ci/ml}$).

5.4.3.3 Samples exceeding the effluent concentration limit will be further evaluated to ensure that doses to individual members of the public are in compliance. Evaluations may include additional analyses to determine specific isotopic concentrations.

5.4.3.4 Annual average concentrations of radioactive material released in airborne effluents shall not exceed the effluent concentrations as specified in the January 1, 1994 revision of 32 IAC 340.

*Describe how
get net counts*

5.5 Investigation

5.5.1 The Offsites Manager or designee will perform investigations and responses consisting of one or more of the following actions in the event that Action Levels are exceeded.

5.5.1.1 Verification of laboratory data and calculations.

5.5.1.2 Analyze and review probable causes.

- 5.5.1.3 Evaluate need for reanalysis or additional analysis on original sample.
- 5.5.1.4 Evaluate need for resampling.
- 5.5.1.5 Evaluate need for sampling of other pathways.
- 5.5.1.6 Evaluate need for notifications to regulators.
- 5.5.1.7 Dose assessments.

5.5.2 All investigations shall be documented.

5.6 Quality Control

- 5.6.1 All air samplers shall be in current calibration.
- 5.6.2 Sample tracking standard operating procedures will be followed for all samples.

5.7 Sample Archive and Disposal

- 5.7.1 All samples will be archived on-site in a suitable area until released by the Site Manager.
- 5.7.2 Samples will be disposed of according to SOPs.

6. Equipment and Materials

- 6.1 Daily Work Area Air Monitoring Sheet
- 6.2 Off Site Daily PAM Issue Sheet

TYPICAL AIR MONITORING REPORT

[illegible]

LINDSAY LIGHT II

Soil Sampling Procedure

Title: Soil Sampling Procedure

Document Number: SOP-214

Revision Number: 0

Approved By:

Date: July 25, 1996

Replaces: None

Objective: The purpose of this procedure is to present protocol for collecting soil samples for the Lindsay Light II Site.

Scope: This procedure applies to samples collected for radiological or geotechnical analysis. Soil samples may be collected of potential backfill soils or other soils. The Field Team Leader will coordinate the sampling efforts.

Procedure:

1. Sampling Plan

Selection of the sampling plan to characterize a soil is a function of the goals of the investigation, the variability of the parameters being measured, and the impact of the variability on the conclusions. Samples may be collected randomly or they may be collected from specific areas deliberately chosen to represent the range of conditions expected or unusual conditions of particular interest. In general, randomly chosen samples are appropriate to assess overall site conditions. However, there may be instances where the significance of an observed condition is of interest. The choice of method will, therefore, depend on the specific goals of the sampling activity.

The procedure presents sampling methods based on random sampling. For the reasons stated above, variations to the methods provided in this procedure may be requested by the Field Team Leader. Such variations shall be documented in the Field Logbook by field personnel.

2. Equipment and Materials

2.1 Equipment and Materials Management

Downhole tools and samplers are cleaned in accordance with the Decontamination Procedure (SOP-LLII347) included in the Procedures Section of Appendix C of the QAPP.

Cuttings, fluids, samples, and water are placed in 55-gallons drums, labeled, properly stored on-site, and disposed of in a manner that does not violate local, state or federal rules or regulations and in a manner that does not damage public or private property.

2.2 Sampling Equipment and Materials

Equipment used for soil sampling includes the following:

- Auger or other Coring Tool
- Shovel and Trowel
- Plastic Collection Bags
- Plastic Sheets (optional)
- Sampling Tracking Form (Form SOP-214-1)
- Field Logbook (SOP-215)
- Radiation Field Screening of Soil Samples Form (Form SOP-214-2 or holding samples)
- Pin Flags (for marking sample locations)
- Container (for collecting potentially contaminated waste generated during the sampling process) (e.g., gloves, plastic sheets, etc.)
- Bucket (filled with clean rinse water)
- Bucket (for homogenizing samples)
- Stainless Steel Brush
- Moist Towelettes
- Paper Towels
- Latex Gloves
- Survey Instrument (for verifying clean sampling equipment and hands)

Other equipment may be substituted if necessary because of availability of the items listed or the conditions encountered at the site. Substitute equipment shall be documented in the Field Logbook and approved by the Field Team Leader.

3. On-Site Stockpile Soil Sampling

The following are the steps to be followed for on-site stockpile soil sampling.

- 3.1. Excavated soil may be stockpiled. Samples from the stockpiles may be analyzed.
- 3.2. The soil may be stockpiled in piles varying from a few to several thousand cubic yards. Because of this potential variation in pile size, no single method for sampling or type of equipment can be prescribed that will work for every situation. The two basic methods that can be used for sampling stockpiles, core sampling method and lift sampling method, are described in paragraphs 7.3 and 7.4, respectively. Both methods are based on the premise that in order for a sample to be representative of the pile, every particle in the pile must have an equal probability of being included in the sample.
- 3.3. One of the methods, the core sampling method, assumes that the pile can be completely penetrated using a coring tool (i.e., sampling probe or drill rig). On conical shaped piles, the sample is to be taken approximately perpendicular to the surface of the pile, midway between the peak and the base, to the center of the pile. On piles with flattened tops, the sample is to be taken perpendicular to the surface from the top to the bottom of the pile.
- 3.4. The other stockpile sampling method, the lift sampling method, assumes that the pile can not be completely penetrated with a sampling tool, and therefore must be sampled either as the soil is placed in lifts onto the pile or before the soil is removed in lifts for use. The samples will, therefore, only be representative of the discrete layer of soil that is exposed to the sampling.
- 3.5. With either sampling method, to identify the areas to be sampled, the pile shall always be faced looking north. For flat topped piles, divide the stockpile into an imaginary grid with square or rectangular shaped sections approximately equal in area; the grids on flat topped piles should be numbered from left to right, top to bottom. For conical shaped piles, divide the stockpile into an imaginary grid with pie shaped sections of equal areas; the grids on conical shaped piles should be numbered in clockwise pattern.

3.6. Determine the initial number of grids and samples as follows:

Pile Size (cubic yards)	Number of Grids	Number of Lift Samples ¹	Number of Core Samples ²
< 50	3	3	3
50 to 100	5	5	5
101 to 500	6	5	6
500 to 1,000	7	5	7
1,000 to 2,000	8	6	8
2,000 to 4,000	9	6	9
4,000 to 6,000	10	7	10
6,000 to 8,000	11	7	11
8,000 to 10,000	13	8	13
10,000 to 20,000	16	8	16
20,000 to 40,000	20	10	20
40,000 to 70,000	30	15	30
70,000 to 100,000	36	15	36
100,000 to — ³	36+	15+	36+

Notes

¹ Take one sample from each grid randomly chosen. In order to choose the grids to be sampled randomly, use some blank sample identification tags and number the tags from one (1) to (n), where (n) represents the number of grids in each pile. Put the tags into a sample bag, shake the bag and reach in and blindly select a tag. Continue selecting tags until the required number of grids are selected. The numbers will be chosen without replacement, that is, without returning the used number to the bag. The samples shall be taken from the grids that correspond to the randomly chosen numbers. An alternative method would be to use a computer generated random numbering system available in various spreadsheet programs (e., Excel).

² From the randomly chosen grids, take one composite sample for approximately every ten (10) feet of soil depth to obtain the required number of samples. For example, if a 98 cubic yard pile is 10 feet high, according to the above table, five (5) composite samples are required (i.e., one for each grid). If an 11,000 cubic yard pile is 30 feet deep, three composite samples, one composite sample at each ten feet of depth, will be taken from 5 of the grids and one composite sample will be taken from a sixth, randomly chosen grid.

³ Add one sample for each additional 10,000 cubic yards.

- 3.7. Take the sample and submit it to the laboratory for analysis.
- 3.8. Statistically test the results of the sample analyses to determine how much uniformity the samples show and whether more samples must be taken.
- 3.9. If necessary, take additional samples and analyze. Continue to repeat steps 3.7 and 3.8 until there are enough samples to characterize the pile.

- 3.10. As directed by the Field Team Leader, identify materials suitable for backfill or other purpose for which the sampling was done.
- 3.11. To compare the sample data with the desired criteria, calculate the average (\bar{X} bar of all the samples) in the pile using:

$$\bar{x} = \frac{1}{n} \sum_{i=1}^n x_i$$

- 3.12. If the average satisfies the desired criteria, the results can be further evaluated to determine whether the data provide a 95 percent confidence level that the true mean (μ) meets the relevant criteria. The Field Team Leader will consult with the Offsites Manager to determine if this further evaluation is required. Attachment 1, Evaluation of Sampling Results, provides the calculations necessary to determine if the sample data provides a 95 percent confidence level that μ meets the relevant criteria.

4. In-Situ Soil Sampling

This section describes the methods for choosing sample locations and sampling methods.

4.1 Sample Location Selection

Appropriate in-situ soil sample locations are determined by the size and uniformity of the deposit being sampled. The sampling pattern depends upon the size of the area, the uniformity of the soil stratum being sampled, and the volume of soil that is being sampled.

Sampling plans for particular purposes may specify a pre-established sampling frequency in terms of the maximum volume of soil represented by a sample. If the soil being sampled is statistically homogeneous, then the locations for samples can be selected randomly over the area and thickness of the deposit. If the soil is not statistically homogeneous, then the area must be broken into subareas within which the soils are statistically homogeneous, and each area sampled separately. The issue of statistical homogeneity is resolved by comparing the range of variation of the property being judged to the acceptability criteria. For example, a deposit of sand and gravel may be statistically homogeneous when judged against a standard that the material not contain boulders and not be homogeneous when judged against a standard that no gravels be larger than one inch.

Clearly, also, the number of samples required to resolve the second comparison may be larger than the number required to resolve the first. The sampling frequencies given in the Sections 7.3 and 7.4 (Stockpile Sampling) may be used as a guide in estimating an initial number of

samples, but the actual number required for a particular purpose depends very strongly upon the requirements and materials being sampled.

4.2 Drilling Procedures

In general, manual or power-auger assisted drilling will be used. Drilling will follow the procedures described in Section 7.2.4.

5. Operational Support Sampling

Sampling may be required to support the excavation and restoration action. This sampling may be performed in instances when the Field Team Leader is interested in the significance of an observed variation or when looking for cursory information to provide operational guidance. The choice of the method will, therefore, depend on the specific goals of the sampling activity as determined by the Field Team Leader. This sampling is not a quality activity, and may be performed outside the requirements of this procedure. However, all deviations requested by the Field Team Leader must be documented in the Field Logbook by field personnel.

The sampling technique for surface sampling, subsurface sampling, and stockpile sampling, as described in this procedure, shall be used when sampling in these instances.

6. Sample Tracking

To establish the documentation necessary to track the sample from the time of collection, the sample identification and Sample Tracking Forms must accompany samples that are sent to the laboratory.

All potentially contaminated samples to be submitted to the laboratory will be screened for radiation in the field. Information obtained from this survey will be documented on the Sample Tracking Form (Form SOP 214-1). Samples taken from potential borrow areas generally are not screened.

7. Sampling Methods

7.1 Surface Soil Sampling

7.1.1. If necessary, to minimize contamination, spread a clean sheet of plastic next to the area to be sampled; assemble the sampling equipment required.

7.1.2. Enter the complete information on the Sample Tracking Form:

- Sample Number
- Sample Matrix
- Sample Location
- Purpose of Sample Collection

- Include applicable comments regarding the sample, location, weather, conditions, or other factors that may be relevant
 - Collected by (your name)
- 7.1.3. Mark the collection bag or prepare the identification tag for the sample.
- 7.1.4. Collect the soil samples that are representative of the soil in the area surveyed. Use a shovel or trowel to collect soil from the depth required.
- 7.1.5. Remove rocks, sticks, and foreign objects greater than approximately one (1) inch.
- Stir and homogenize the soil in a bucket as much as practicable. Using the hand trowel, randomly scoop the soil from the bucket. Save alternating scoops of material to collect the required sample size; return the other material to the sampling locations.
- 7.1.6. Attach the identification tag to the sample bag if appropriate and place the bag in the sample container.
- 7.1.7. Decontaminate the sampling equipment as required by Section 2.1.
- 7.1.8. Return any location markers (such as pin flags) that were removed in order to sample. Fill in all sampling holes to eliminate a possible tripping hazard.
- 7.1.9. If specific data are not available, mark a pin flag with the sample identification number and place the flag at the center of the sampling location before leaving.

7.2 Subsurface Sampling (Undisturbed Soils)

- 7.2.1. If necessary, to minimize contamination, spread a clean sheet of plastic next to the area to be sampled; assemble the sampling equipment required.
- 7.2.2. Enter the complete information on the Sample Tracking Form:
- Sample Number
 - Sample Matrix
 - Sample Location
 - Purpose of Sample Collection
 - Include applicable comments regarding the sample, location, weather, conditions, or other factors that may be relevant
 - Collected by (your name)
- 7.2.3. Mark the collection bag or prepare the identification tag for the sample.

- 7.2.4. Sample the material using a hand core sampling tool or hammer driven split spoon sampler

Alternatively, an auger method may be used.

Cut a hole, approximately six (6) inches in diameter, in the center of a plastic sheet. Center the sheet of plastic over the area to be sampled. Using an auger, drill through the hole in the plastic to the desired sampling depth; keep the auger turning until no more material comes up. The soil around the hole, on the plastic sheet, is fairly well mixed and representative of the interval just drilled.

If the soil sample is to be obtained from a particular depth (not a composite from surface to depth), and the material refuses to pass into the coring tool, the following sampling method will be performed. Drill through the hole in the plastic to the top of the desired sampling depth; keep the auger turning until no more material comes up. Remove the auger and sample the material using a hand core sampling tool or hammer driven split spoon sampler. The first three inches of the sampled obtained will be considered slough and not part of the desired sample.

NOTE: If, due to the conditions of the sampling area, this method does not work, an alternative method(s), approved by the Field Team Leader, may be used. Alternative methods, when used, will be documented by the field personnel in the Field Logbook.

- 7.2.5. Remove rocks, sticks, and foreign objects greater than approximately one (1) inch in diameter.

NOTE: The removed rocks will be collected and submitted as a separate sample.

- 7.2.6. Using a hand trowel, collect approximately one (1) quart of the augured soil in the plastic sample bag or jar. For core segments, place each 6-9 inch (nominally 5-7 inch) segment in the plastic sample bag or jar.
- 7.2.7. Label the sample container.
- 7.2.8. Return unused material to the sampling hole and fill in the hole to eliminate possible tripping hazard.
- 7.2.9. Decontaminate the sampling equipment as required by Section 2.1.
- 7.2.10. When required, mark a pin flag with the sample identification number and place the flag at the center of the sampling location before leaving.

7.3 Stockpile Sampling (Core Sampling Method)

- 7.3.1. If necessary, to minimize contamination, spread a clean sheet of plastic next to the area to be sampled and assemble the sampling equipment required.
- 7.3.2. Enter the complete information on the Sample Tracking Form:
 - Sample Number
 - Sample Matrix
 - Sample Location
 - Purpose of Sample Collection
 - Include applicable comments regarding the sample, location, weather, conditions, or other factors that may be relevant. Identify the approximate size of the stockpile. (A 70 cubic yard pile of soil is approximately ten feet high with a base diameter of approximately 26 feet.) Include a brief description of the equipment used to obtain the sample (i.e., sub-soil sampler, drill rig, etc.).
 - Collected by (your name)
- 7.3.3. Before sampling, determine the number of grids and samples as described in Section 3.6. Record the information in the Field Logbook.
- 7.3.4. Mark the collection bag or prepare the identification tags for the samples.
- 7.3.5. Using an auger or other coring tool, take the required number of samples from the pile. A hollow stem auger will be used when discrete, rather than composite, samples are collected.
- 7.3.6. Place the sample material in the sample bag and attach the identification tags. Place the sample bag in the container.
- 7.3.7. Decontaminate the sampling equipment as required by Section 2.1.

7.4 Stockpile Sampling (Lift Sampling Method)

- 7.4.1. If necessary, to minimize contamination, spread a clean sheet of plastic next to the area to be sampled and assemble the sampling equipment required.
- 7.4.2. Enter the complete information on the Sample Tracking Form:
 - Sample Number
 - Sample Matrix
 - Sample Location

- Purpose of Sample Collection
- Include applicable comments regarding the sample, location, weather, conditions, or other factors that may be relevant. Identify the approximate size of the stockpile. (A 70 cubic yard pile of soil is approximately ten feet high with a base diameter of approximately 26 feet.) Include a brief description of the equipment used to obtain the sample (i.e., sub-soil sampler, drill rig, etc.).
- Collected by (your name)

7.4.3. Before sampling, determine the number of grids and samples as described in Section 3.6. Record the information in the Field Logbook.

7.4.4. Mark the collection bag or prepare the identification tags for the samples.

7.4.5. Using the appropriate sampling tool, take the required number of samples from the lift approximately perpendicular to the surface of the lift at the appropriate locations. Composite the sample through the entire lift thickness.

7.4.6. Place the sample material in the sample bag and attach the identification tags. Place the sample bag in the container.

7.4.7. Decontaminate the sampling equipment as required by Section 2.1.

7.5 Soil Sample Size

7.5.1. Each soil sample will be a minimum of four (4) pounds and the sample may exceed 10 pounds. Sample size requirements are detailed in Sample Preparation Procedure for Gamma Spectral Analysis (SOP-LLII364).

8. Equipment Cleaning

To avoid cross-contamination, the sampling equipment will be cleaned prior to and between samples. The following steps will be followed to clean equipment.

Remove loose contamination by gently tapping/shaking the item.

Using the stainless steel brush or paper towels, remove material that did not dislodge.

If the item appears to be clean (i.e., no visible clinging soil), proceed to the next sampling area.

If the item does not appear to be clean or if a survey with the appropriate instrument does not verify that it is, scrub the item with

water. While holding the item over the sampling location, rinse the item with water.

Dry the item with paper towels or repeat the scrubbing sequence as necessary.

Rinse gloved hands. Change gloves when changing sampling areas if a self-frisking indicates that contamination is present after rinsing.

Approximately one percent of the time, swipe the item as described in the Gamma Radiological Survey SOP (SOP 210). Submit the swipes to the laboratory for analysis to confirm the effectiveness of the decontamination protocol. (This step is necessary only when sampling soils where radiologic contamination is suspected.)

Dispose of cleaning materials, plastic sheeting, and gloves as contaminated materials in accordance with instructions provided by the Field Team Leader.

9. Quality Control

9.1 QC Samples

To evaluate the variance in the soil sampling protocol, field duplicates will be collected at specified intervals. These QC samples will be identified and noted in the Field Logbook.

To validate the sampling protocol used for surface sampling, initially one (1) area on every twenty (20) sub-grids sampled.

For surface sampling, the duplicates shall be randomly selected and identified before sampling activities begin. The duplicate sample material will be collected using the next scoop full of material each time the initial sample is saved.

For subsurface samples, one duplicate subsurface sample will be taken for every twenty (20) samples.

For subsurface sampling, the duplicate will be collected from the representative augered material.

For stockpiles, one duplicate will be taken for every twenty (20) stockpile samples, or one each day that stockpile sampling takes place, whichever is greater.

The stockpile duplicate will be taken from the node of two grids. The duplicates will be randomly selected and identified before the sampling begins.

The Field Team Leader will calculate the mean and the standard deviation for the samples analyzed. If the duplicate sample results are within three (3) standard deviations of the sample population, the sampling protocols can be considered acceptable.

If the Offsites Manager approves, the Field Team Leader can reduce the frequency of the QC duplicate sampling based on the results obtained. Changes shall be documented in the Field Logbook.

9.2 Data Review

Entries in the Field Logbook will conform to the Field Logbook Standard Operating Procedures.

Daily, the Field Team Leader will review the Field Logbook, resolve any discrepancies that were noted by field personnel, and sign the book to indicate the pages reviewed. If the Field Team Leader recorded the discrepancy, the Quality Assurance Supervisor will review the Field Logbook and resolve any discrepancies that were noted.

NOTE: Discrepancies relating to reported data will be brought to the attention of the Field Team Leader.

10. Health and Safety

Personal protective equipment and clothing, as required by the Health and Safety Plan, will be used when collecting and handling contaminated soils.

The site radiological conditions will be determined and documented before sampling begins. During the sampling process, the principles of As Low As Reasonably Achievable (ALARA) will be followed.

11. Records

The following documents will be maintained as quality records:

- Field Logbooks
- Sampling Tracking Forms
- Results of all Calculations and Statistical Analyses Performed

12. References

Soil Sampling Procedure for Field Verification System and the Field Portable Units at the Kerr-McGee Rare Earths Facility. August 1994

U.S. Nuclear Regulatory Commission, NUREG/CR-5849, Manual for Conducting Radiological Surveys in Support of License Termination, June 1992.

13. Attachments

Attachment 1 Evaluation of Sampling Results

FORM SOP-214-1
SAMPLE TRACKING FORMS

Date: _____

Page ____ of ____

Sample Number	Matrix (S/W)	Location	Collected For	Comments	Collected By
Released by/Company			All samples listed above are hereby released except for:		Date/Time
Received by/Company			All samples listed are hereby received except for:		Date/Time
Received by/Company			Data for all samples listed above are hereby received except for:		Date/Time

FORM SOP-214-2
FIELD SAMPLE SCREENING FORM

Sample Type:	Sample ID Number:	
Date:	Time:	
Counting Instrument:	Sample Date:	
Reading Units:		
Signature of Technician:		Date:
Signature of Reviewer:		Date:

ATTACHMENT 1 - EVALUATION OF SAMPLING RESULTS

# of pages > 1			
Post-It™ brand fax transmittal memo 7671	From	To	Larry Jensen
	Co.	Co.	45 CPA
	Dept.	Phone #	(312) 888-5026
	Fax #	Fax #	

1. Calculate the standard deviation(s):

$$s = \sqrt{\frac{\sum (\bar{x} - x_i)^2}{n - 1}}$$

Where: \bar{x} = calculated average
 x_i = sample value
 n = number of samples

2. Calculate :

$$\mu_{\sigma} = \bar{x} + t \left(\frac{s}{\sqrt{n}} \right)$$

Where: μ = the upper 95% confidence level for the true mean (μ)
 \bar{x} = calculated average
 s = standard deviation (calculated above)
 n = number of samples
 t = a statistic used for small sample test of hypotheses (the Student Distribution). Some values for "t" are provided.

3. Interpretation

- 3.1 Does the mean of the samples exceed a release criterion?

Compare μ to the release criteria (C_0). If μ is less than C_0 , the area being tested meets the guideline at a 95% confidence level. If μ is greater than C_0 , but the \bar{x} bar, calculated previously, is less than C_0 , a larger sample might be able to demonstrate compliance. Use the sample average (\bar{x} bar) and standard deviation(s) to calculate the total number of samples required.

$$n = \frac{t^2 s^2}{(C_0 - \bar{x})^2}$$

Where: C_0 = release criterion
 n = number of samples
 t = a statistic used for small sample test of hypotheses (the Student Distribution). Some values for "t" are provided

- 3.2 Does the mean of the samples exceed background?

If $\bar{x} \leq B + t \left(\frac{s}{\sqrt{n}} \right)$

where: B is the background value,

then the mean is less than or equal to the background value. The discrimination of the test can be improved by obtaining additional samples as described in 3.1 above.

why n samples?
only composite
per 100 m²

μ is gross value
 C_0 is calculated by

B has to have
a t

"t" values

Degrees of Freedom	t95%	Degrees of Freedom	t95%
5	2.015	19	1.729
6	1.943	20	1.725
7	1.895	21	1.721
8	1.860	22	1.717
9	1.833	23	1.714
10	1.812	24	1.711
11	1.796	25	1.708
12	1.782	26	1.706
13	1.771	27	1.703
14	1.761	28	1.701
15	1.753	29	1.699
16	1.746	30	1.697
17	1.740	40	1.684
18	1.734		

Degree of freedom is the number of samples minus 1; for values of degrees of freedom not in table, interpolate between values listed.

Source: U.S. Nuclear Regulatory Commission, NUREG/CR-5849, Manual for Conducting Radiological Surveys in Support of License Termination, June 1992.

LINDSAY LIGHT II PROJECT

Field Logbook Procedure

Title: Field Logbook Procedures

Document Number: SOP-215

Revision Number: 0

Approved By:

Date: July 25, 1996

Replaces: None

Objective: This procedure describes standard protocol for the use and control of the Field Logbooks used during the Lindsay Light II Site (Site) remediation.

Scope: This procedure applies to field activities that are associated with the Lindsay Light II Site cleanup.

Procedure:

1.1 Field Logbook Format

1.1.1 Prior to entering the field, page numbers shall be assigned to the pages of the Field Logbook. Pages shall include the date. Kerr-McGee may use pre-printed Field Logbooks in which some of these items are filled in. Each Field Team Leader and other field personnel taking measurements, observing tests, or performing other related work, will be issued a Field Logbook.

1.1.2 The first set of pages for a day will include the following items (in the order indicated):

- personnel on Site,
- contractor personnel on Site (names of employees for the companies represented), others on Site (e.g., regulators, visitors),
- weather,

- equipment used.
- equipment calibration,
- sketch of work area, and
- summary of work.

1.1.3 The remaining pages for a day will record the field activities and should include the following:

- meetings (meeting attendees, person who called the meeting, time, location, decisions, and decision makers);
- start and end time of activities;
- visits by others;
- regulator - directed;
- comments made by regulator, visitor, etc.;
- working conditions;
- general description of work area;
- sketch of work areas and showing significant relative locations, etc.;
- progression of work (e.g., faster or slower, reason for delays, etc.);
- description of equipment used, including general name, brand name, model number, etc.;
- description of amount of material excavated and levels of contamination observed (if known), and
- procedure/field changes and authorizations.

1.2 Quality Control

1.2.1 The Project QA Supervisor, or his designee, will review field logbooks for completeness, proper field note correction (single line strikeout), and content.

1.2.2 Field logbooks will be audited for accuracy at the discretion of the Project Quality Assurance Supervisor.

References

Kerr-McGee Chemical Corporation Quality Assurance Manual

Equipment and Materials

Field Logbook.

Indelible pen or pencil.

LINDSAY LIGHT II PROJECT

Work Order Development Procedure

Title: Work Order Development Procedure

Document Number: SOP-216

Revision Number: 0

Approved by:

Date: July 25, 1996

Replaces: None

1. PURPOSE

To provide a procedure to prepare a Work Order for the Lindsay Light II Site (Site).

2. SCOPE

This procedure will cover all documents which are deemed by the Offsites Manager to be necessary to identify and facilitate the necessary excavation and restoration actions. The Work Order will be prepared by or under the direction of the Offsites Manager.

3. PROCEDURE

3.1 The Work Order is used to identify objectives and organize the input parameters for the tasks, and present methods to develop the output needed to accomplish the required tasks. This procedure applies to those tasks requiring the management of contractors or the implementation of design specifications.

3.2 Identification and Gathering of Input Parameters - The following input information must be gathered for the Work Order before excavation can commence at the Site. A map of the Site with the following information marked on the map should be developed for inclusion in the Work Order.

3.2.1 Delineation of the area to be remediated.

3.2.2 Previous sampling data.

- 3.2.3 Additional sampling data.
- 3.2.4 Utility location maps for work area.
- 3.2.5 City map for the delineation of the haul route from the Site to the railroad loading terminal.
- 3.3 Generation of Output Parameters - The output parameters form the guidance for the work. The following information will be generated and be included in the Work Order.
 - 3.3.1 Drawings (maps) that delineate survey baselines, and initial excavation limits (horizontal and vertical), staging areas, and haul route.
 - 3.3.2 Drawings (maps) that depict existing features (structures, landscaping, paving, or other significant or unique features). These features may be included on the same map as 3.3.1.
 - 3.3.3 Photographs of Site documenting features within and around the work area.
 - 3.3.4 Instructions for remediation, including:
 - 3.3.4.1 Name and phone numbers of property owner.
 - 3.3.4.2 Name and phone numbers of tenant.
 - 3.3.4.3 Special instructions that may affect remediation activities.
 - 3.3.4.4 Outline of construction sequence (including access, remediation activities, sampling, backfill, restoration).
 - 3.3.4.5 Names and phone numbers for utilities, emergency medical units, police and fire department and key project personnel. Also include any other applicable phone numbers not specifically identified here.
 - 3.3.4.6 Instructions for contacting property owner, tenant and utilities (time, contact person, additional numbers, and information required).
 - 3.3.5 Reference to Applicable Standards (identifying action limits and verification criteria).
 - 3.3.6 Testing Plan (for excavation sampling).

3.4 Procedure for Developing Work Order

This section describes the approach to preparing the Work Order for the Site.

3.4.1 Review areas requiring excavation as described in the STS Report for Characterization Investigation Gamma Radiation Survey (STS Report).

3.4.2 Get utility maps from various utilities (DIGGER).

3.4.3 Visit site.

3.4.3.1 Establish approximate property lines.

3.4.3.2 Mark (flag) buried utilities.

3.4.3.3 Photograph work areas.

3.4.3.4 Take additional samples to further define initial excavation areas.

3.4.4 Develop Excavation Plan Drawing.

3.4.4.1 Show excavation areas, stockpile areas, loading areas, ingress and egress to site, and haul route to railroad loading terminal.

3.4.4.2 Delineate initial dust control plan, and water management plan (include any features such as temporary berms).

3.4.4.3 Describe incremental excavation plan (initial excavation areas, initial cuts, and interim testing protocol). See Excavation SOP (SOP-217) for additional details.

4. QUALITY CONTROL

4.1 The Work Order prepared under this SOP is not a quality-related document; however the individual activities required to complete the Work Order will be completed in accordance with Kerr-McGee's Project Quality Assurance Program where applicable. Quality control for the Work Order will be in accordance with applicable document control and quality SOPs in this Removal Action Work Plan.

4.2 Quality control requirements for specific activities in the Work Order will be included with these procedures, or identified as separate quality control specifications identified in this Scoping and Planning document.

LINDSAY LIGHT II PROJECT

Excavation Procedure

Title: Excavation Procedure

Document Number: SOP-217

Revision Number: 0

Approved by:

Date: July 25, 1996

Replaces: None

1. PURPOSE

To provide a uniform method of remediation for the Lindsay Light II Site.

2. SCOPE

This procedure will cover Lindsay Light II Site excavation activities, which are deemed quality critical by the Offsites Project Manager.

3. PROCEDURE

3.1 Delineation of extent

3.1.1 Delineate initial areas and depths. Areas and depths will extend slightly beyond estimated extent of impacted soil. Initial areal extent will be established using information from the STS Report for Characterization Investigation Gamma Radiation Survey (STS Report). Depths will be established during delineation drilling.

3.1.2 Initial excavation limits will be within three inches of the estimated bottom limit.

3.2 Excavate delineated soil mass

3.3 Sampling scheme

3.3.1 Re-establish survey grid.

3.3.1 Locate diagonals across grid square.

3.3.2 Survey the bottom of the excavation as described in SOP 210.

3.4 Verification Sampling

3.4.1 If all measurements within a grid are less than the cleanup criteria limit, then grid is clean. No further excavation is required in this grid.

3.4.2 If any measurements within an excavation are greater than the action criteria limit, then additional excavation is required.

3.4.2.1 Proceed through sequence 3.1 through 3.4 again.

3.4.2.2 Mark subareas around grid points that exceeded the action limit.

3.4.2.2 Contact Field Team Leader for guidance of additional excavation.

3.5 Completion

3.5.1 After grid has met criteria, give documentation of delineation, excavation, and sampling to Field Team Leader.

3.5.2 Grid is available for Verification Sampling.

4. QUALITY CONTROL

4.1 Quality control for the excavation activities and associated documentation will be in accordance with applicable SOPs in the Quality Assurance Project Plan for Lindsay Light II Site.

5. REFERENCES

1992, NUREG/CR-5849, Manual for Conducting Radiological Surveys in Support of License Termination, Draft Report.

LINDSAY LIGHT II PROJECT

Borrow Sampling Procedure

Title: Borrow Sampling Procedure

Document Number: SOP-220

Revision Number: 0

Approved By:

Date: July 25, 1996

Replaces: None

Objective: The purpose of this procedure is to present protocol for sampling borrow soil from off-site sources for the Lindsay Light II Site (Site) to determine if the radioactivity in the proposed borrow soil is within the background range. Background will be established as described in Section V.3.e of the Unilateral Administrative Order (UAO).

Scope: This procedure applies to soil samples collected and tested for radiological or geotechnical analysis. Samples from off-site borrow sources will be obtained for every 10,000 cubic yards of borrow soil used. Sampling procedures for backfill from on-site sources are described in the Soil Sampling SOP (SOP-214) for both stockpiled and in-situ material. The Field Team Leader will coordinate the sampling efforts. This procedure will be used to sample borrow soils remote from the Site that should exhibit only background radiation, and are considered for use as backfill or topsoil.

Procedure:

1. Sampling Plan

Selection of the sampling plan to characterize a source of borrow soil is a function of the goals of the investigation, the variability of the parameters being measured, and the impact of the variability on the conclusions. Samples may be collected randomly or they may be collected from specific areas deliberately chosen to represent the range of conditions expected or unusual conditions of particular interest. In general, randomly chosen samples are appropriate to assess overall Site conditions. However, there may be instances where the significance of an observed

condition is of interest. The choice of method will, therefore, depend on the specific goals of the sampling activity.

The Soil Sampling Procedure (SOP-214) presents sampling methods based on random sampling. For the reasons stated above, variations to the methods provided in this procedure may be requested by the Field Team Leader. Such variations shall be documented in the field logbook.

2. Equipment Management

Downhole tools and samplers are cleaned in accordance with the decontamination procedures described in SOP-214.

3. Borrow Soil Sampling

If the off-site borrow soil is stockpiled, then samples will be taken from the stockpile in accordance with the stockpile sampling procedure in SOP-214, Soil Sampling Procedure except for frequency of sampling. Sample size also is described in SOP-214. If the borrow soils have not been excavated, then the sampling will be done in accordance with the in situ procedure in the same SOP.

Backfill soils obtained from off-site locations will be obtained from locations thought to be uncontaminated. Consequently, less-intense sampling is contemplated to demonstrate compliance of off-site soils with backfill criteria than is proposed for demonstrating compliance of on-site backfill soils.

Samples from off-site borrow sources will be obtained for every 10,000 cubic yards of borrow soil used. The sufficiency of this frequency will be determined by the results of the sampling. At least one sample will be obtained from each borrow source, and additional samples may be taken at the direction of the Offsites Manager.

The radioactivity of the soil will be considered acceptable for use as backfill if the average value of the samples is within the background range.

4. Borrow Soil Analyses

Samples of borrow soils will be tested to determine the total radium (Ra-226 + Ra-228) content. Backfill material will meet the established U.S. EPA backfill criteria of 3.7 pCi/g combined Ra-226 and Ra-228.

Geotechnical testing and material requirements for common borrow are described in Section 2200, Sections 1.7(c) and 2.1 of the Specifications.

3.7 pCi/g
same from D.C.
Should we use
it here?

5. Quality Control

Quality control for the borrow sampling documentation will be in accordance with applicable quality assurance SOPs in the Removal Action Work Plan and the Quality Assurance Project Plan. Reporting requirements are stated in Section 2200 and Section 2420 of the Specifications for common and topsoil borrow, respectively.

6. References

Lindsay Light II Site SOP-214, Soil Sampling.

Lindsay Light II Specifications 2200 and 2420.

LINDSAY LIGHT II SITE PROJECT

Verification Survey Procedure

Title: Verification Survey

Document Number: SOP-223

Revision Number: 0

Approved By:

Date: July 25, 1996

Replaces: None

1. PURPOSE

The purpose of this procedure is to present protocol for conducting verification surveys at the excavations at the Lindsay Light II Site.

2. SCOPE

This procedure applies to all completed excavations that are done as a result of the excavation area being identified as containing soil exceeding the cleanup criteria.

3. PROCEDURE

3.1 EQUIPMENT AND MATERIALS

Equipment used for verification survey may include the following:

3.1.1 Compass or theodolite

3.1.2 Cloth or steel tape

3.1.3 Stakes, survey flags, or spray paint

3.2 GRID LAYOUT

3.2.1 The verification survey will be conducted at all excavations.

3.2.2 The grid used for the STS Survey, or similar locations will be re-established for the verification survey.

3.2.3 The diagonals across each grid square will be located.

- 3.2.4 The location halfway between the grid corner and the center of the grid will be surveyed.

3.3 VERIFICATION

- 3.3.1 Measurements will be made according to the procedures described for Gamma Radiological Surveys (SOP-210).
- 3.3.2 If all measurements within a grid are less than the cleanup criteria limit, then grid is clean. No further excavation is required in this grid.
- 3.3.3 If any measurements within an excavation are greater than the action criteria limit, then the Field Team Leader shall guide additional soil removal until the excavation measures below the cleanup criteria.

4. DOCUMENTATION

- 4.1 A scale drawing of the survey area showing the locations and results of the gamma measurements will be created.
- 4.2 The drawing and gamma measurements will be delivered to the U.S. EPA with a Notice of Successful Verification and a request for approval to backfill the excavation (Form SOP 223-1).

5. QUALITY CONTROL

- 5.1 Quality control for the verification documentation will be in accordance with applicable quality assurance SOPs in the Quality Assurance Project Plan for Lindsay Light II Site.

6. REFERENCES

- 6.1 Lindsay Light II SOP 210. Gamma Radiological Survey
- 6.2 Lindsay Light II Quality Assurance Project Plan

FORM 223-1
NOTIFICATION OF SUCCESSFUL VERIFICATION SURVEY

Area Identification: _____

Date of Verification Survey: _____

Time of Verification Survey _____ am/pm

The above-described excavation was surveyed at the time and date indicated above. The survey indicated that all soils have been removed as required by the Lindsay Light II Site Removal Action Criteria.

Documents pertaining to this survey are attached for review and approval by the U.S. EPA.

Signed:

_____ Date _____

_____ (Print Name)

_____ (Print Title)

For Kerr-McGee Chemical Corporation

The attached Verification Survey documents were reviewed by U.S. EPA, Region V on _____ . The results of this survey indicate that the verification criteria as contained in the UAO, have been met.

Authorization is hereby granted to commence backfill and restoration work at this excavation.

Signed:

_____ Date _____

_____ (Print Name)

_____ (Print Title)

For U.S. EPA Region V

RARE EARTHS FACILITY

STANDARD OPERATING PROCEDURES

The following procedures are Rare Earths Facility Standard Operating Procedures (REF SOPs) that are adopted as relevant to the Lindsay Light II Site. These procedures describe activities that are common both to REF work and Lindsay Light II Site work. Where REF procedures exist for similar activities, the REF procedures have been included in the Quality Assurance Project Plan in lieu of providing separate Lindsay Light II procedures. This avoids near-duplication of procedures for similar activities that might cause confusion between the requirements of the two projects.

The following is a list of REF SOPs included:

Document Title	Document Number
Project Training Program	SOP-LLII100
Project Filing System	SOP-LLII101
Project Scheduling	SOP-LLII102
Control of Interim Changes to Scoping and Planning Documents	SOP-LLII103
Radioactive Materials Shipment	SOP-LLII320
Surveys of Surface Contamination-and Release of Equipment for Unrestricted Use	SOP-LLII 345
Decontamination	SOP-LLII347
Sample Preparation Procedure for Gamma Spectral Analysis	SOP-LLII364
Operation and Calibration of the Model AP210S Ohaus Analytical Plus Electronic Balance	SOP-LLII368
Operation of the Ludlum Model 2000 Alpha System	SOP-LLII372
Portable Survey Instrument Operability Checks	SOP-LLII376

An Enduro core
shipping papers
section would be
useful

LINDSAY LIGHT II SITE

Standard Operating Procedure

Title: Project Training Program

Document Number: SOP-LLII100

Revision Number: 0

Approved By:

Date: July 25, 1996

Replaces: None

PROJECT TRAINING PROGRAM

1.0 SCOPE

1.1 Purpose

This procedure establishes a method by which all project personnel will receive training commensurate with their duties.

1.2 Applicability

This procedure applies to all project personnel including both routine and nonroutine site employees in support of engineering, construction and operation.

2.0 REFERENCES

- 2.1 32 Illinois Administrative Code, Parts 310 and 340, Standards for Protection Against Radiation
- 2.2 32 Illinois Administrative Code, Part 400, Notices, Instructions and Reports to Workers; Inspections
- 2.3 West Chicago Project, Health and Safety Plan for Decommissioning Activities at the Kerr-McGee Chemical Corporation Rare Earths Facility, West Chicago, Illinois
- 2.4 West Chicago Project, Training Lesson Plans and Project Procedures
- 2.5 West Chicago Project, Quality Assurance Manual, section 19.0 "Job Requirements & Training"
- 2.6 West Chicago Project, Quality Procedure Manual, SOP-DOC #7 "Training Procedure"
- 2.7 West Chicago Project, WCP - 330 "External Dose Measurement"
- 2.8 West Chicago Project, WCP - 303 "Security Procedure"

3.0 DEFINITIONS

3.1 Airborne Radioactivity Area

This term defines radiation conditions within a specified area. An area where the average concentration of airborne radioactivity could allow an individual to exceed 12 DAC-hrs over a one week period.

3.2 Clean Area

This term defines radiation conditions within a specified area. An area where the radiation levels and contamination levels are maintained below 2 mrem/hr and 33 dpm/100 cm² alpha respectively.

3.3 Contamination Control Area

This term defines radiation conditions within a specified area. An area that may be contaminated to a level greater than a Clean Area.

3.4 Contamination Reduction Zone

The area on one side of the Control Line where personnel can decontaminate, remove their personal protective clothing and equipment. (See "Support Zone Layout" drawing #200-CV-007 on site, offsites per work order.)

3.5 Control Line

The demarcation that separates a Clean Area from a Contamination Control Area. As an example, a control line is located in the personnel decon facility.

3.6 Craft Personnel

Employees and contractors who physically perform the activities described on the SWP.

3.7 Derived Air Concentration-Hour (DAC-hour)

The product of the concentration of radioactive material in air (expressed as a fraction or multiple of the derived air concentration for each radionuclide) and the time of exposure to that radionuclide (expressed in hours). *This is expressed by the formula:*

$$AC-HR = \left[\frac{C_A}{DAC} \right] \times HR$$

where:

C_A = radionuclide concentration in air

Clean Area can be confused with accessibly etc. area (< 5 ft/hg)

3.8 Exclusion Zone

The area on one side of the Control Line that includes Contamination Control Areas, Radiation Areas, and Airborne Radioactivity Areas.

3.9 Frisking

A survey (i.e. of an individual's clothing and exposed body) that is performed to determine if contamination is present.

3.10 Protective Clothing

Reusable or disposable coveralls, boots and gloves that provide a barrier between contamination and personnel.

3.11 Radiation Area

This term defines radiation conditions within a specified area. An area where the whole body radiation level is greater than 5 mrem/hr.

3.12 Radiation Worker

Routine and Non-Routine Site Personnel who require unescorted access to areas of the Exclusion Zone.

3.13 Site

For the purposes of this procedure, the SITE is defined by the Site Manager as areas of the project that include the Exclusion Zone and Contamination Reduction Zone.

3.14 Special Work Permit (SWP)

A document which describes the radiological conditions of the work area or task and delineates safety and radiation protection requirements to be followed in the work area or when performing the task.

3.15 Support Zone

The area just outside the Control Line at the entrance to the Contamination Reduction Zone or the Exclusion Zone. This clean area is used to stage material prior to being taken into the Exclusion Zone.

3.16 Thermoluminescent Dosimeter (TLD)

A device that measures radiation dose.

3.17 Work Location Record

A form that lists specific work locations, personnel protective equipment, and time worked at each location.

4.0 REQUIREMENTS

4.1 Prerequisites

4.1.1 All personnel required to work in the Contamination Reduction Zone or the Exclusion Zone shall complete training conforming to the requirements of 29 CFR 1910.120(e) including 40 hours of initial hazardous wastesite worker training. Where appropriate they shall have 8 hours of annual refresher training, and 8 hours supervisors training.

4.1.2 Field personnel shall complete radiation safety training in compliance with 32 IAC 400. This training shall include, at a minimum, 4 hours of training pertaining to radiation safety and awareness. The training will address the four different types of radiation, the difference between radiation and contamination, acute and chronic exposures, natural and man-made sources of radiation, the radiation risks and dose limits to the fetus, personnel monitoring, contamination monitoring, biological effects of radiation and dose terminology (eg. CDE, CEDE, DDE, TEDE and SDE).

4.1.3 Contractors shall provide written documentation to the Site Manager, via the *Project Quality Assurance Department*, as evidence that their employees have met the training *and/or* experience requirements in paragraph 4.1.1 and 4.1.2 *prior to attending Site Orientation as described in 5.2 below. Evidence of training and/or experience prior to Site Orientation may be waived with approval by Kerr-McGee.*

4.1.4 Kerr-McGee training shall be conducted by a qualified Safety Specialist and/or a qualified Senior Health Physics Technician, as a minimum. Project Management may request the services of other speciality personnel to

supplement general safety and health physics training (ie. daily construction activities, machine operations, quality system activities...etc.)

4.1.4.1 Trainers should meet the minimum education and experience requirements of the job classification implementing the particular procedure(s).

4.1.4.2 Trainers should have additional site work experience in the areas of training.

4.2 Tools, Material, Equipment

4.2.1 Lesson Plan(s) outlining course subject matter.

4.2.2 Project procedures and work plan/instructions.

4.2.3 Handouts, slide shows, overheads and test/examination as applicable.

4.3 Precautions, Limits

Personnel will be denied unescorted access to the Exclusion Zone if they do not receive documented general and site specific orientation training.

4.4 Acceptance Criteria

Personnel requiring unescorted access to the Exclusion Zone will have satisfied the training requirements of this procedure (*reference attachment #6*).

5.0 PROCEDURE

5.1 Training Program Requirements

5.1.1 The Project Manager, or the responsible manager in his absence, will identify those person(s) responsible for providing Training.

5.1.2 The Project Manager, or the responsible manager in his absence, will review and approve, by signing and dating, all methods of training to be used (ref. 2.5).

The Site Manager/*Offsite Manager* is responsible to ensure all personnel involved in quality critical activities have been properly trained. The Construction/Operation Manager is responsible to ensure only qualified personnel are allowed to perform critical activities and processes.

list 50/40 25T

5.1.3 Training will be provided using one or a combination of the following methods:

① Class Room Training - Using a Lesson Plan (approved) or Procedure (approved).

② Reading Assignment - Using approved procedures and/or work plans/instructions.

③ On the Job Training (OJT) - Observed by and documented by the individuals direct supervisor, using Attachments 3 & 4.

5.1.4 All records documenting training shall be signed and dated by the trainee as completed. They are also acknowledging that any questions they had about the training subjects or materials have been resolved and are fully understood by the trainee.

5.1.5 A review of training material (eg. lesson plans, procedures...) shall occur periodically, annually as a minimum, by the responsible area managers to ensure adequate training is being provided and that the training is current and consistent with today's project specific practices. Records of these reviews ("training needs assessment" per ref. 2.6, SOP-DOC #7) are maintained by the responsible area manager as well.

5.1.6 Oral, written, or practical testing covering this material may be used to indicate satisfactory completion to any portion of the Training Program. Documentation of this training shall be retained by Kerr-McGee or its designee in the project files.

5.1.7 Trainee's who do not satisfactorily complete the radiation safety requirements, as evidenced by a passing grade on the exams of at least 70%, shall be required to retake the training and retake the tests. Personnel who fail to satisfactorily complete the training will not be granted unescorted access to the Exclusion Zone.

5.1.8 All attendance, certifications, completed reading assignments and test scores will be documented and filed appropriately by the training instructor.

5.2 Site Orientation (REF/RAR)

Can a person
continually get < 70%
& still work in
exclusion zone?

5.2.1 All personnel entering the Facility for employment are required to attend, or have provided to them, site *specific* training prior to starting assignment. A Personal History/Employee History form shall be completed by each new employee at this time (see Attachment #5) to initiate issuance of personnel

I. D. badge.. Also, each employee shall complete an IDNS Form 4 (reference 2.7 Attachment #1) to initiate issuance of dosimetry.

5.2.2 Site-specific orientation will be provided to all project personnel by Kerr-McGee or its designee. This training will include the following subjects:

- Key Project/Site Personnel
- Site Location and History
- Waste Hazard: Description, Characterization and Degree
- Training Requirements
- Medical Surveillance Program
- Bioassay and Dosimetry Program
- Site Control Areas
- Personal Protective Equipment
- Air Monitoring and Levels of Protection
- Contamination Reduction Procedures
- Safe work Practices and Communications
- Hazard Communications
- Emergency Preparedness

Detailed information can be found in the current version of the Health & Safety Plan, or by contacting the Site Safety Specialist.

5.2.3 Construction and Operations training will be provided to field workers to explain their responsibilities regarding safe operations in accordance with approved West Chicago Project field procedures.

5.2.4 Field workers (both Routine and Non-Routine Site Employees) shall complete the necessary field experience training under the direct supervision of a trained supervisor per 29 CFR 1910.120 (e) (3) (ref. forms in Attachment #3 and #4).

5.3 Indoctrination of State Inspectors

5.3.1 State inspectors required to work on the site shall be requested to complete training or have site experience including conforming to the requirements of 29 CFR 1910.120(e) including 40 hours of initial training and as appropriate 8 hours of annual refresher training.

5.3.2 State inspectors are exempt from the requirements of this Project Training Program. However, site specific training will be provided if they consent.

5.4 Visitor Training

*What about Fed.
inspectors?
Indoctrination?*

- 5.4.1 All visitors are required to read and sign the Visitor Information sheet shown in Attachment 2 per reference 2.8 above, upon arrival to the Facility.
- 5.4.2 Training for each visitor is determined on an individual basis by the responsible area manager or the Site Manager in their absence.
- 5.4.3 A briefing concerning radiation hazards and warning signs is given by a qualified health physicist to all visitors entering the radiation controlled areas.
- 5.4.4 A qualified health physicist will determine the limitations imposed on visitor access to certain areas within the site. Visitors entering the Exclusion Zone must be escorted by trained personnel at all times.
- 5.5 Supplemental Training
 - 5.5.1 Additional training may be provided to all project personnel (including clerical personnel) to review specific job task procedures and work instructions. This training is the responsibility of individual supervisors and shall be provided as needed to support learning new or revised job task.

6.0 RECORDS/REPORTS/NOTIFICATIONS

6.1 Records

Attendance sheets, test scores and training aids and other associated training records shall be maintained at the West Chicago Project in accordance with reference 2.5.

7.0 ATTACHMENTS

7.1	Attachment 1	Attendance Sheets (EXAMPLE)
7.2	Attachment 2	Visitor Information Form
7.3	Attachment 3	OJT Training Record (Routine Site Employee)
7.4	Attachment 4	OJT Training Record (Non-routine Site Employee)
7.5	Attachment 5	Personal History
7.6	<i>Attachment 6</i>	<i>Project Training Flowchart</i>

Attachment 2
Visitor Information Form

ATTACHMENT 2



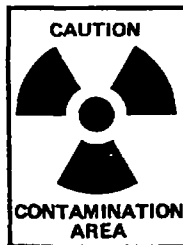
KM-4782

VISITOR INFORMATION

NOTICE TO VISITOR: ALL VISITORS MUST BE ESCORTED AT ALL TIMES WHILE ON THIS SITE.



CAUTION. Radioactive materials are present on this site. Radioactive materials may be found throughout the site. Grounds, buildings and equipment have low levels of contamination.



CONTROLLED AREAS: Do not enter areas with these signs unless you have an escort or health physics has given specific approval and you understand access limitations.



You must wear protective clothing in controlled areas. Health physics will provide you with instructions.



You must wear a personal radiation dosimeter if you enter an area which is controlled.



No smoking, eating, drinking or chewing in controlled areas.
NO EXCEPTIONS.

You may request to see radioactive materials license for this facility as granted by the USNRC. Notify Health Physics if you do not understand these instructions.

NAME _____ DATE _____

OJT TRAINING RECORD

(Routine Site Employees - eg. Equipment Operators, General Laborers, Supervisory Personnel)

In compliance with Title 29 CFR 1910.120 (e) Training - (3) Initial Training (i), the site worker listed below has satisfactorily completed three days actual field experience under the direct supervision of a trained, experienced supervisor. This training is in addition to the HAZWOPER TRAINING that have been received off the site.

Site Worker's Name (Print)

Supervisor's Name (Print)

Site Worker's Signature/Date

Supervisor's Signature/Date

Company Name (of Trainee's)

Company Name

OJT TRAINING RECORD

☐

(Non-routine Site Employees - eg. Satellite Trailer Contractor, Land Surveyor,
Groundwater Monitoring, Geo-Phys. Surveying..)

☐

(Routine Site Employees - eg. Project Management Team - Except Administrative/Clerical Types Office
Employees...)

In compliance with Title 29 CFR 1910.120 (e) Training - (3) Initial Training (ii), and (iii) the site worker listed below has satisfactorily completed one day actual field experience under the direct supervision of a trained, experienced supervisor. This training is in addition to the HAZWOPER TRAINING that have been received off the site.

Site Worker's Name (Print)

Supervisor's Name (Print)

Site Worker's Signature/Date

Supervisor's Signature/Date

Company Name (of Trainee's)

Company Name

**Attachment 5
PERSONAL HISTORY**

NAME	SSN:	DATE:
DATE OF BIRTH:		
HOME ADDRESS:		
CITY:	STATE:	ZIP CODE:

EMPLOYMENT HISTORY

PRESENT EMPLOYER:	EMPLOYMENT DATES:	FROM	TO
PREVIOUS EMPLOYER:	EMPLOYMENT DATES:	FROM	TO
PREVIOUS EMPLOYER:	EMPLOYMENT DATES:	FROM	TO
PREVIOUS EMPLOYER:	EMPLOYMENT DATES:	FROM	TO
PREVIOUS EMPLOYER:	EMPLOYMENT DATES:	FROM	TO

TRAINING/DOSIMETRY

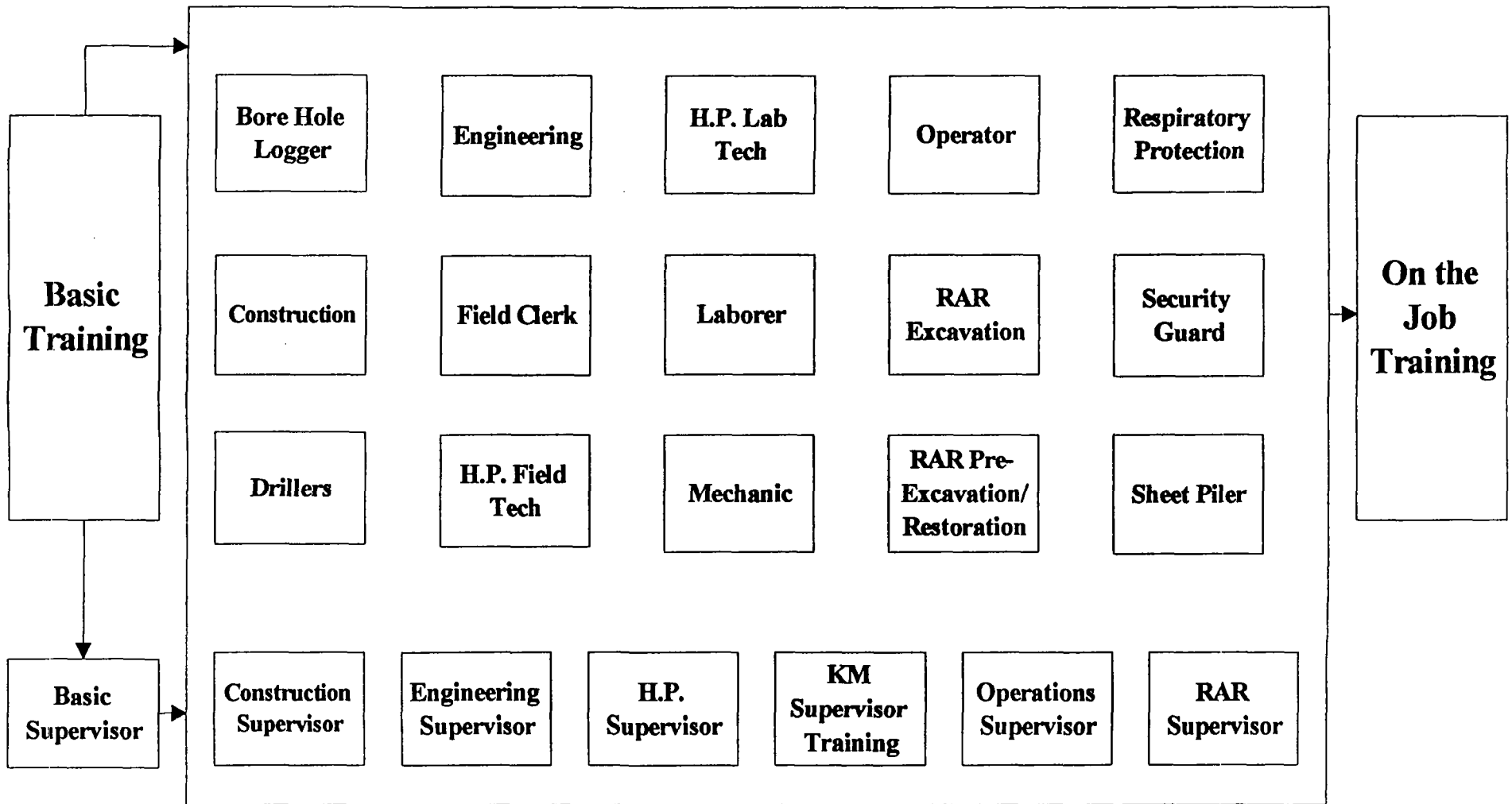
HAZWOPER 40 HOUR	HAZWOPER 8 HOUR REFRESHER	HAZWOPER SUPERVISOR
RADIATION TRAINING	SITE ORIENTATION	MEDICAL EXAMINATION
TLD ISSUED YES <input type="checkbox"/> NO <input type="checkbox"/>	O.J.T.	ID BADGE ISSUED YES <input type="checkbox"/> NO <input type="checkbox"/>
DATE:	OCCUPATION	JOB CLASS
NUMBER:		

OTHER TRAINING

CPR	FIRST AID	PULMINARY
RESP. FIT TEST		

Project Training Flowchart

Site Specific / Orientation



LINDSAY LIGHT II SITE

Standard Operating Procedure

Title: Project Filing System

Document Number: SOP-LLII101

Revision Number: 0

Approved By:

Date: July 25, 1996

Replaces: None

PROJECT FILING SYSTEM

1.0 SCOPE

1.1 Purpose

The purpose of this procedure is to establish a system for the collection, indexing, access, and filing of quality records for the West Chicago Project in accordance with reference 2.2 below.

1.2 Applicability

This procedure is required for all records identified as critical to the West Chicago Project, including those that appear on the Master Quality Records List. Other non-critical documents may be included, but at the originator's and/or the Responsible Area Manager's discretion.

2.0 REFERENCES

2.1 Kerr-McGee Chemical Corp. - QPM, SOP-DOC #2 "Document Control Procedure"

2.2 ANSI/ASQC 9001-1994, section 4.16 "Control of Quality Records"

2.3 Kerr McGee Chemical Corp. - QPM, SOP-DOC #11 "Quality Records Procedure"

3.0 DEFINITIONS

NONE

4.0 REQUIREMENTS

4.1 Prerequisites

All documents to be included in the Project Filing System (including KMCC home office or one of the job sites) shall be accounted for on the file index, either by type of document (e.g. IDNS Correspondence, Permits, Drawings...etc.) or by document name (e.g. Health and Safety Plan, Material Safety Data Sheets, NCR's/CAR's, Closure Plan, Monitoring Well Installation Logs...etc.).

4.2 Tools, Material, Equipment

NONE

4.3 Precautions, Criteria

NONE

4.4 Acceptance Criteria

4.4.1 Reviews for accuracy and completeness shall be performed prior to records being placed in the filing system. (i.e. Reviews of all survey data by the site Radiation Safety Officer-RSO, is required per IDNS license, #STA-583, condition #22. G.)

4.4.2 File numbers will appear in a conspicuous location on all records in the filing system.

5.0 PROCEDURE

Prior to any field activities, the Project Manager is responsible for establishing a filing system for storage and retrievability of quality records per reference 2.3 above. These files shall utilize the same divisions and numbering system as the Home Office filing system. The West Chicago's Rare Earths Facility (REF) project files were developed in the early design stages of the project in the home office by the Engineering Manager. When a Field Office is activated, appropriate copies of field generated documents, in addition to those in 5.1 below, are forwarded to be included in the Home Office files (as determined by the Responsible Area Manager). Upon project completion and closeout, the appropriate Site/Offsite files will be transmitted to the Home Office for retention. All West Chicago Project files have currently been identified as Lifetime records.

5.1 Contents

The field filing system should be as complete as practical. It may be unnecessary and impractical to duplicate everything in the Home Office files for the field. Following is a list of minimum requirements. Dual storage is not a mandatory requirement of the KMCC quality system, which is ANSI ASQC-9001 (reference 2.2 above).

5.1.1 Contract(s): an executed copy of the appropriate contract(s), license agreements, work plans and work orders, etc.

- 5.1.2 Drawings and specifications: a copy of the latest revision of each of the Master Project Set' drawings and specifications will be designated as the Master Reference Set as relate to the field activity.
- (a) The Master Reference Set will be kept current with "Approved for Project Use" documents, and mark-ups as needed to reflect actual construction. This information will be used by Engineering at the end of the project to generate as-builts/record documents.
 - (b) It may be necessary to maintain a working set of frequently used drawings in the field in order to protect the Master Reference Set from damage.
 - (c) Large jobs may require more than one copy, and possibly a reproducible of each drawing. A CAD link may supplement this requirement as in the case of Offsites activities for GIS mapping between the client (USEPA) and Kerr-McGee gamma survey activities.
- 5.1.3 Schedule: a copy of the original contractual schedule, updated schedules, and progress reports.
- 5.1.4 Correspondence: a copy of appropriate letters to and from the contractor, scope or scheduling changes and correspondence to regulatory agencies, consultants, vendors, etc.
- 5.1.5 Purchases: a copy of appropriate RFP's, PO's, and LPO's, receiving and expediting reports from the Home Office, Plants, Field Offices, and Contractors.
- 5.1.6 Change orders: a copy of all preliminary and executed or rejected change requests and change orders for field activities.
- 5.1.7 Safety: a copy of Process Safety Analysis studies, verification of contractor compliance with required OSHA training, site orientation and drug testing, job regulations, safety rules, safety meetings notes, accident reports, safety warnings, emergency response checklist and MSDS sheets.
- 5.1.8 Reports: a copy of daily force reports, including the contractor force reports with manpower load by discipline, periodic reports, etc.

5.1.9 Tests and inspections: a copy of soil and concrete test, equipment alignment, electrical tests, hydrotests, etc.

5.1.10 Permits: a copy of applicable permits.

5.1.11 Compliance documents: a copy of applicable license agreements, orders, quality standards and procedures, etc.

5.2 Revisions

5.2.1 Suggested and/or needed changes to a particular file index shall be forwarded to the Document Control Clerk for processing. The REF file index is controlled and issued by the Home Office Document Control Clerk, who reports directly to the Engineering Manager. The Residential Area Removal Sites (RAR) and other offsite project files are controlled and issued by the Document Control Clerk who reports directly to the Project Quality Supervisor. The Project Manager has the ultimate responsibility for the initiation and upkeep of the filing system and associated indexes.

6.0 RECORDS/REPORTS/NOTIFICATIONS

6.1 A copy of the current file index shall be available to employees at all time. A copy will be found in the Document Control area.

7.0 ATTACHMENTS

NONE

LINDSAY LIGHT II SITE

Standard Operating Procedure

Title: Project Scheduling

Document Number: SOP-LLII102

Revision Number: 0

Approved By:

Date: July 25, 1996

Replaces: None

1.0 SCOPE

1.1 Purpose

This procedure outlines the planning and scheduling program for the West Chicago Project. The purpose of this program is to provide for the scheduling and periodic updating of current and remaining work activities through project closure.

1.2 Applicability

This procedure applies to team members on the West Chicago Project who provide input to the master schedule. The objective is for the schedule to reflect the most likely overall plan at the time of issue. The schedule will be used by team members for planning their individual work in support of the overall project plan.

2.0 REFERENCES

- 2.1 Kerr-McGee West Chicago Project, Quality Systems Document ANSI/ASQC Q9001-1994-4.1

3.0 DEFINITIONS/DESCRIPTIONS

- 3.1 Primavera - The computer system used to produce the project schedule. Primavera is the CPM based system selected for this project.
- 3.2 Early Start/Early Finish - The earliest time a given activity can be started and completed based on the logical constraints of that activity as determined by project personnel.
- 3.3 Data Date - The point in time shown on the schedule reports when the status of each activity was determined.
- 3.4 Percent complete - The physical percent complete of a specific activity on the data date.
- 3.5 Operating Period - The months of March through November during which most construction and operation occurs.

4.0 REQUIREMENTS

4.1 Prerequisites

None

4.2 Tools, Material, Equipment

Use hardware (IBM 486 or better) and software (Primavera windows version 1.1 or later) to analyze the data and produce the various reports from Primavera. Input data must be structured and coded such that information can be presented in a variety of formats to meet the needs of those using the plan.

4.3 Precautions, Criteria

NONE

4.4 Acceptance Criteria

Project Scheduling shall reflect all critical quality activities outlined in the Work Plan as a minimum (reference 2.1 above). The schedule will reflect all significant changes to the various work plans (i.e. additions to the Closure Plan for the REF project and modifications to the Scoping and Planning Document for the RAR project).

5.0 PROCEDURE

5.1 Schedule Preparation

5.1.1 The Project Control Engineer will solicit input from the Responsible Area Managers and project staff involved with the project. Information will also be solicited from contractors in addition to observing progress at the site or any location where engineering, procurement, construction and/or operations activities are being performed (i.e. vendor submittal, equipment assembled, design developed, etc). Status of regulatory requirements, inspections and document submittals will be incorporated into the schedule.

5.1.2 Preliminary schedules shall be prepared and reviewed by key team members. Comments are resolved under the coordination of the Project Controls Engineer, who shall incorporate the results into the Project Schedules.

5.2 Schedule Content

5.2.1 The schedule shall contain design engineering, procurement and construction activities for all major equipment. During the operating period of each year, the scheduled activities shall be expanded to a level sufficient for day to day monitoring of work plans/orders.

5.2.2 The schedule shall contain estimates of regulatory submittals and permits required for the identified work. The schedule shall contain the latest approved remediation/removal operation plan(s). The operation activities will be resource loaded, as identified by Responsible Area Managers, to provide timely and accurately forecasts of processing and shipping quantities.

5.3 Schedule Logic

5.3.1 The activities in 5.2 shall be defined with relationships to each other such that the resulting network may be analyzed to produce a viable overall plan.

5.4 Schedule Issue Frequency

5.4.1 As requested by the Project Manager or his designee, the schedule will be updated by the Project Controls Engineer to reflect significant changes to the project. The schedule will normally be updated every two weeks during the operating period. These bi-weekly updates are used primarily to monitor daily activity to complete each work plan/order. Periodically, the Master Schedule is formally issued to designated personnel. As a minimum, the Master Schedule will be formally issued twice during each operating period.

5.4.2 Schedules will be issued as required for special purposes such as bid packages and mandated regulatory submittals.

5.4.3 During construction activities, schedules may be issued more frequently and with a higher level of detail than the Master Schedule, to monitor individual contracts.

6.0 RECORDS/REPORTS/NOTIFICATIONS

6.1 Schedules are to be issued to designated personnel under a cover letter by the Project Manager or designee per the frequency in 5.4 above.

- 6.2 All schedules and supporting data are forwarded to Document control for project filing in accordance with the applicable file index.

7.0 ATTACHMENTS

- 7.1 Attachment 1 - Sample Schedule Report

Attachment 1
(Example of Primavera Systems)

ACT.	EARLY START	EARLY FINISH	REM DUR	1995												1996			
				A	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR			
K45		31JUL95A	0				◆	Appl -	1995	Activities		(Partial)							
K60		2AUG95A	0				◆	Appl -	Emergency	Plan	(pond)	AMEN30							
K62		2AUG95A	0				◆	Appl -	Water	Management		Plan -	AMEN30						
K03		2AUG95A	0				◆	Appl -	Env	Ponds	1/5	Suffical -	AMEN30						
K15	21AUG95A	13OCT95	25							Design	- Batch	Water	Treatment						
L14	28AUG95A	29SEP95	15																
L01		29SEP95	0						◆	KMcG	Submit	Appl	Construct	Batch	Water	WTP			
L70		16OCT95	0							◆	Appl - Global	Activities							
L16		16OCT95	0							◆	Impose	Uranium	Standard						
L13	12DEC95	23JAN95	30				Prepare / Bid	Contract -	4 Force	Main									
L19		21DEC96	0					Issue	Construction	Permits	BWTP	◆							
K54		22DEC95	0									◆	Issue - N	PDES Permit					

Plot Date	18SEP95		Activity Bar/Early Dates
Data Date	11SEP95		Critical Activity
Project Start	1JUN94		Progress Bar
Project Finish	22DEC99	◆ /	Milestone/Flag Activity

0911

Kerr McGee Chemical

Phase II West Chicago Site

Sample Schedule Report

Date	Revision	Checked	Approved

(C) Primavera Systems, Inc.

LINDSAY LIGHT II SITE

Standard Operating Procedure

Title: Control of Interim Changes to Scoping and Planning Documents

Document Number: SOP-LLII103

Revision Number: 0

Approved By:

Date: July 25, 1996

Replaces: None

CONTROL OF INTERIM CHANGES TO SCOPING & PLANNING DOCUMENTS

1.0 SCOPE

1.1 Purpose

This procedure provides a method of control *for* all interim changes, to the Scoping and Planning Documents, that *will enable the project staff* to continue work at or associated with Superfund Sites *prior to their approval. All proposed changes to Scoping and Planning Documents will be reviewed, discussed and approved by the U. S. EPA. However, there is a substantial time delay in receipt of official approval.*

1.2 Applicability

This process applies to all proposed changes to the Scoping and Planning Documents, while in the interim, Kerr-McGee awaits U. S. EPA approval on the official updated documents. The interim changes are necessary to continue work on Superfund Sites and not be in violation of *previously* approved procedures.

2.0 REFERENCES

Kerr-McGee West Chicago Project-Quality Procedure Manual-SOP DOC#2 "Document Control Procedure"

3.0 DEFINITIONS

Interim Change- A desired modification or required deviation, from the currently approved Scoping and Planning Documents, necessary for allowing work to continue, but prior to its incorporation and USEPA approval.

4.0 REQUIREMENTS

NA

5.0 PROCEDURE

- 5.1 Interim changes may be requested/proposed by anyone in the organization through an initiating manager or supervisor. When a change is necessary, the *Interim Change Form (see attachment 1)* may be used *as a guide to initially* document the following:
 - 5.1.1 Describing the requirement(s) as currently *existing*.
 - 5.1.2 *Description of the proposed* change(s).
- 5.2 *Originator shall forward proposed change(s) to their immediate supervisor for review. If then the supervisor and the Offsites Manager find merit in its need to allow continued execution of work activities, the draft change will be documented on the orange colored Interim Change Form (if it hadn't already been initiated) and sequentially numbered from the log by Document Control at the West Chicago Project site.*
- 5.3 *The Offsite Manager, via the WCP Document Control, will route the original copy of the Interim Change Form to the Offsite Project Manager (located in OKC) for review with USEPA, and comment and/or approval. The review with the USEPA may take place during the EPA/ KMCC monthly meetings, it may take place through telephone conversation, fax copy, or a number of ways of available project communications. This review and agreement does not need to be documented, nor does it require USEPA to counter sign the Offsite Project Manager's approval. The Offsite Project Manager has the responsibility for assuring proper change approvals and implementation of this procedure.*
 - 5.3.1 Comments will be returned to the originating *supervisor*, by way of the *site* Document Control, for resolution.
 - 5.3.2 Final changes proposed will be *returned* to the Offsite Project Manager for approval.
 - 5.3.3 *Site* Document Control will *initiate control* distribution of the approved Interim Change Form to *each S&P Document holder*, for implementation.

- 5.3.4 Document Control will maintain a record of all interim changes for incorporation into the next general revision of "Scoping and Planning Document".

6.0 RECORDS/REPORTS/NOTIFICATIONS

- 6.1 Interim Change Form(s) shall be maintained in the project files for the life of the project *or until such time the change has been incorporated into the S&P Documents. The form(s) may then be packaged, at the Offsite Manager's discretion, to be shipped to the WCP main office for life time storage as requested by the Kerr-McGee Law Department.*
- 6.2 *These documents are consider quality records and will be filed with the Scoping and Planning Document.*
- 6.3 *Document Control services may be contracted out. For example, Grant Environmental prepared and distributed the official 1995 revisions to the Scoping and Planning Document for the Residential Area Removal Site or project. In which case, the successful Contractor shall provide Kerr-McGee with the appropriate records to verify compliance to this procedure and associated Kerr-McGee Chemical Corporation Quality System requirements.*
- RAR
- 6.4 *The contractor providing document control services should include, as part of the records of compliance, a copy of the most current version of the controlled distribution list (and the names of the recipients) for all applicable project documents they've issued on behalf of Kerr-McGee.*

7.0 ATTACHMENTS

- 7.1 Attachment 1 Interim Change Form (Example)

ATTACHMENT 1
Interim Change Form (Example)

Change No. _____

Document No. _____

Section No. _____

Page No. _____

Revision No. _____

Requirement:

Change:

Effective Date:

Approval:

OFFSITE PROJECT MANAGER

DATE

LINDSAY LIGHT II SITE

Standard Operating Procedure

Title: Radioactive Material Shipments

Document Number: SOP-LLII320

Revision Number: 0

Approved By:

Date: July 25, 1996

Replaces: None

RADIOACTIVE MATERIAL SHIPMENTS

1.0 SCOPE

1.1 Purpose

To establish a procedure that will insure the safe and proper shipment of radioactive *waste* material off-site in compliance with IDNS, NRC, and DOT regulations.

1.2 Applicability

This procedure is applicable at all times for all limited quantity, LSA, and Type A-Yellow II shipments of radioactive materials destined for off-site locations.

2.0 REFERENCES

- 2.1 32 Illinois Administrative Code, Parts 310 and 340, Standards for Protection Against Radiation
- 2.2 32 Illinois Administrative Code, Part 400, Notices, Instructions and Reports to Workers; Inspections
- 2.3 West Chicago Project, Health and Safety Plan for Decommissioning Activities at the Kerr-McGee Chemical Corporation Rare Earths Facility, West Chicago, Illinois
- 2.4 State of Illinois Department of Nuclear Safety License Number STA-583
- 2.5 10 CFR Part 20.1906
- 2.6 10 CFR Part 71.47 and 71.87
- 2.7 10 CFR Part 71 Statements of Consideration
- 2.8 I&E Information Notice 85-46: Clarification of several Aspects of Removable Radioactive Contamination Limits for Transport Packages
- 2.9 49 CFR Parts 172 and 173
- 2.10 32 Illinois Administrative Code, Part 341, Transportation of Radioactive Material

- 2.11 Utah Radioactive Material License No. *SMC-1559* with current amendments issued to Envirocare of Utah, Inc.
- 2.12 West Chicago Project, Operations' Radioactive Waste Shipment & Disposal *Record* Procedure - WCP 617.
- 2.13 DOT exemption #E11075 granted to Kerr-McGee Chemical Corporation, Oklahoma City, Oklahoma, September 2, 1994.
- 2.14 Operations' Bill of Lading Procedure - WCP-614.
- 2.15 Survey and Decontamination of Railcars Procedure, WCP-632.

3.0 DEFINITIONS

3.1 A_1

This is the maximum activity of special form radioactive material permitted in a Type A package.

3.2 A_2

This is the maximum activity of radioactive material, other than special form radioactive material, permitted in a Type A package.

3.3 Limited Quantity of Radioactive Material

This is the quantity of radioactive material that does not exceed the materials package limits specified in 49 CFR 173.423 and which conforms with the requirements specified in 49 CFR 173.421.

3.4 Low Specific Activity (LSA)

LSA material is any of the following:

- 3.4.1 Uranium or thorium ores and physical or chemical concentrates of those ores.
- 3.4.2 Unirradiated natural or depleted uranium or unirradiated natural thorium.
- 3.4.3 Tritium oxide in aqueous solutions provided the concentration does not exceed 5.0 millicuries (185 MBq) per milliliter.

3.4.4 Material in which the radioactivity is essentially uniformly distributed and in which the estimated average concentration per gram of contents does not exceed:

- a. 0.0001 millicurie (3.7 kBq) of radionuclides for which the A_2 quantity in Appendix A of 32 IAC 341 is not more than 0.05 curie (1.85 GBq).
- b. 0.005 millicurie (185 kBq) of radionuclides for which the A_2 quantity in Appendix A of 32 IAC 341 is more than 0.05 curie (1.85 GBq), but not more than 1 curie (37 GBq); or
- c. 0.3 millicurie (11.1 MBq) of radionuclides for which the A_2 quantity in Appendix A of 32 IAC 341 is more than 1.0 curie (37 GBq).

3.4.5 Objects of non-radioactive material externally contaminated with radioactive material, provided that the radioactive material is not readily dispersible and the surface contamination, when averaged over an area of 1 square meter, does not exceed 0.0001 millicurie (220,000 transformations per minute) (3.7 kBq) per square centimeter of radionuclides for which the A_2 quantity in Appendix A of 32 IAC 341 is not more than 0.05 curie (1.85 GBq), or 0.001 millicurie (2,200,000 disintegrations per minute) (37 kBq) per square centimeter for other radionuclides.

3.5 Package

This is the packaging together, with its radioactive contents as presented for transport.

3.6 Packaging

This is the assembly of components necessary to ensure compliance with the packaging requirements of 32 IAC 341. It may consist of one or more receptacles, absorbent materials, spacing structure, thermal insulation, radiation shielding, and devices for cooling or absorbing mechanical shocks. The vehicle, tie down system, and auxiliary equipment may be designated as part of the packaging.

3.7 Radioactive Material

Any material having a specific activity greater than $2.0 \text{ E-03 } \mu\text{Ci/g}$. (49 CFR 173.403); **2000 pCi/g**

3.8 Transport Index (TI)

This is the dimensionless number (rounded up to the first decimal place) placed on the label of a package to designate the degree of control to be exercised by the carrier during transportation. The transport index is the number expressing the maximum radiation level in millirem per hour at 1 meter from the external surface of the package.

3.9 Type A Quantity

This is a quantity of radioactive material, the aggregate radioactivity of which does not exceed A_1 for special form radioactive material or A_2 for normal form radioactive material, where A_1 and A_2 are given in Appendix A of 32 IAC 341 or may be determined by procedures described in Appendix A of 32 IAC 341.

4.0 REQUIREMENTS

4.1 Prerequisites

4.1.1 A copy of *the consignee's* up-to-date radioactive material license *shall* be on file at the Kerr-McGee West Chicago Facility, *so the Site Manager or his designee can verify* that the consignee is licensed to receive the radioactive material.

4.1.2 All containers shall be inspected by the Site Manager *or designee* prior to loading *and* palletizing, to insure that the container's integrity is adequate, *and then inspected again to insure* that the containers have been loaded and closed in accordance with applicable Kerr-McGee procedures.

4.1.3 For shipments of radioactive material for disposal, compliance with disposal site facility criteria and specific state and federal license provisions applicable to the material shall be verified by Site Manager.

4.1.4 For packages of *radioactive* waste material intended for shipment to Envirocare of Utah for disposal, the Site Manager or *designee* shall verify that the pre-shipment characterization *process has* been completed.

4.2 Tools, Material, Equipment

4.2.1 Calculator.

4.2.2 *Packaging, labels and containers*

4.3 Precautions, Limits.

4.3.1 *Radioactive waste material that is to be* shipped for disposal must be classified according to 32 IAC 340.1052 and meet the requirements of 32 IAC 340.1055.

4.3.2 The maximum permissible limits for removable contamination for a package:

Contaminant	$\mu\text{Ci}/\text{cm}^2$	dpm/cm ²
Beta/gamma emitting nuclides; nuclides with $T_{1/2} < 10$ days; natural uranium; natural thorium; U-235; U-238; Th-232; Th-228; and Th-230 when contained in ores or physical concentrates.	10^{-5}	22
All other alpha emitting nuclides	10^{-6}	2.2

NOTE: In cases of packages transported as exclusive use shipments by rail or highway, the non-fixed radioactive contamination must not exceed the above limits at the beginning of transport, and, at any time during transport, must not exceed 10 times the above limits.

4.3.3 The radiation levels at any point on the external surface of the package must not exceed 200 mrem/hr and the Transport Index must not exceed 10. Packages transported as exclusive use by rail or highway may exceed these limits provided that the following conditions are met:

	Open Vehicle	Closed Vehicle
Package Surface	≤ 200 mrem/hr	≤ 1000 mrem/hr
Vehicle	≤ 10 mrem/hr at 2 meters from vertical planes ≤ 2 mrem/hr in cab	≤ 200 mrem/hr at any point on the outer surface of the vehicle ≤ 10 mrem/hr at 2 meters from vertical planes ≤ 2 mrem/hr in cab

4.3.4 Under DOT Exemption #E11075, the radiation levels at any point on the external surface of a railcar carrying *radioactive waste material to disposal facility*, must not exceed 10 mrem/hr.

4.4 Acceptance Criteria

4.4.1 Radioactive material has been properly prepared, packaged, marked, labeled, and loaded onto a vehicle and is in proper condition for transport.

4.4.2 All necessary forms, surveys, and manifests have been prepared and the "shipping papers" packet is complete.

4.4.3 All necessary state and local authorities and material receivers have been properly notified of the shipment.

4.4.4 All necessary paperwork has been completed and signed and a copy of the "shipping papers" packet has been filed for Kerr-McGee's records.

4.4.5 For *radioactive* waste shipments for disposal, confirmation of receipt at the disposal facility is acknowledged within 20 days of shipment, or an investigation is initiated.

4.4.6 *Deleted*

5.0 PROCEDURE

5.1 Verify that the intended consignee (receiver) of the material has a valid license to accept the type and quantity of radioactive material.

NOTE

Typically, groundwater samples, surface water samples, and environmental air samples that are shipped offsite do not meet the regulatory definition of "Radioactive Material" and therefore do not require radioactive material shipping paperwork.

5.1.1 The A_1 and A_2 values for radionuclides are the limits in curies from which a shipment type is determined.

5.2 If the package activity does not exceed $10^{-3} A_2$ curies, the radiation level on the external surface is ≤ 0.5 mrem/hr, and the package meets the other requirements of 49 CFR 173.423 and 49 CFR 173.421, it may be shipped as "LIMITED

QUANTITY," and a bill of lading will normally be used, although they are not required by regulation. Go to Step 5.5. for "LIMITED QUANTITY" shipments.

5.3 Determine the following information for inclusion on the bill of lading *and/or the radioactive waste shipment & disposal record* form for each package in the intended shipment:

5.3.1 Proper shipping name and hazard class from 49 CFR 172.101, Columns 2 and 3.

5.3.2 Proper UN identification number from 49 CFR 172.101, Column 3.a.

5.3.3 Principal radionuclides (greater than 1% of total activity).

5.3.4 Determine whether or not RQ (Reportable Quantity) must appear on the bill of lading per 49 CFR 173.201(a)(1)(iii).

- a. Using Table 2 of Appendix to 49 CFR 172.101, determine if a single radionuclide exists as a reportable quantity.
- b. If a mixture of nuclides exists, use the sum of the ratios of the quantity of a nuclide per package and the RQ for the nuclide. A package contains an RQ of a hazardous substance when the sum of the ratios is ≥ 1 .
- c. If the quantities or identities of some of the nuclides in a package are unknown, follow the instructions found in the Appendix to 49 CFR 172.101 step 6 for RQ determination.
- d. If not exempted from specification marking, a package with a capacity of 110 gallons or less must have the letters RQ in association with the proper shipping name.

5.3.5 Physical and chemical form of material.

5.3.6 Net quantity (activity) in each package.

5.3.7 Category of RADIOACTIVE label applied to each package.

- a. Any package requiring a RADIOACTIVE YELLOW II label must be identified on the bill of lading.

5.3.8 Transport Index for all packages labeled RADIOACTIVE YELLOW II.

5.3.9 For each shipment of radioactive material, emergency response information must be maintained during transportation and at facilities where hazardous

materials are loaded for transportation or otherwise handled during any phase of transportation.

- a. Emergency response information is not required for shipments of radioactive materials excepted from the shipping paper requirements of subchapter C of 49 CFR, such as those shipments designated as limited quantity.
- b. Complete form, Emergency Response Information (Attachment 2) and include with the shipping papers for the radioactive material shipment.

5.4 If the package of radioactive material is to be shipped for disposal, the following are additional required steps:

5.4.1 Use form, Radioactive Waste Shipment Checklist (Attachment 3), *for shipments to a disposal facility.*

5.4.2 Verify that the *radioactive waste material* has been classified in accordance with 32 IAC 340.1052.

5.4.3 Verify *that the package's records meets the radwaste material* form requirements of 32 IAC 341.1055.

5.4.4 Use Envirocare's Radioactive Waste Shipment & Disposal Record form (see Reference 2.12) as the manifest form for all shipments of radioactive *waste material going* to Envirocare of Utah, Inc.

5.4.5 *Mail or otherwise send, separate from the shipment, a copy of the disposal site shipping manifest to the disposal facility operator. This copy of the shipping manifest may be sent the same day that the shipment leaves the site.*

5.4.4.1.1 *The disposal site operator is required to acknowledge receipt of the shipment within seven days of arrival by returning a signed copy of the first page of the shipping manifest (or equivalent) to the shipper.*

5.4.6 *Verify and document on form Radioactive Waste Shipment Checklist, (Attachment 3), that the return receipt for the shipment has been received within 20 days of shipment. For shipments whose receipt has not been acknowledged within 20 days, initiate a trace investigation in accordance with 32 IAC 340.1060(h).*

5.5 Packages shipped as "LIMITED QUANTITY" in accordance with 49 CFR 173.421, *are excepted from* specification packaging, package marking, labeling, *and shipping paper requirements* provided:

- a. Package meets "strong, tight" requirements of 49 CFR 173.24.
- b. Inner liner, if present, or outer packaging, if not, is marked with the word "RADIOACTIVE."
- c. Package activity does not exceed $10^{-3}A_2$ for solids and gases, or $10^{-4}A_2$ for liquids.
- d. Package external contamination levels do not exceed 2200 dpm/100 cm² β and 220 dpm/100 cm² α .
- e. Package contact radiation level ≤ 0.5 mR/hr.
- f. Form, Shipment Certification (Attachment 4), is either included within each package, with the packing slip, or provided to the vehicle operator.

5.5.1 Deleted

5.5.2 If the limited quantity shipment involves an environmental sample being shipped for analysis, ensure that a copy of the Chain of Custody Record (*ref. Kerr-McGee form #KM-4775*) accompanies the sample being shipped.

5.6 For packages shipped by rail or highway under the "EXCLUSIVE USE" provisions of 49 CFR 173.403 (i), the following additional steps are required:

- 5.6.1 Verify that the certification statement of 49 CFR 172.204: "This is to certify that the above-named materials are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulation of the Department of Transportation," appears on the shipping paper, and is signed by the Site Manager, or his *designee*.
- 5.6.2 If a Radioactive Yellow II label is required, record the package contents (radionuclides), number of curies, and Transport Index (TI) on the label. Affix label to two opposite sides of the package (excluding the bottom) near the proper shipping name.
- 5.6.3 Verify that the radioactive material has been properly prepared, packaged, marked, labeled, and loaded on the vehicle.

- 5.6.4 Ensure that package radiation and contamination surveys have been performed and documented, and that package radiation and contamination levels are within the limits specified in Section 4.3.
- 5.6.5 Ensure that the vehicle has been completely tarped, blocked and braced, or the packaged material sufficiently restrained to preclude movement within the vehicle during normal transport.
- 5.6.6 Ensure that the vehicle or rail car is properly placarded per Subpart F of 49 CFR 172. If placarding is required and shipment is by vehicle, all four sides must have placards.
- 5.6.7 Verify that a radiation survey of the loaded vehicle has been performed and documented on Shipment Load Diagram (Attachment 5).
- 5.6.8 Complete Form Exclusive Use Vehicle Instructions to Carrier (Attachment 6), and have the vehicle operator read the exclusive use statement and acknowledge compliance his or her signature, and include a signed copy with the shipping papers.
- 5.6.9 For closed vehicles, install tamper seals on all cargo area doors and padlocks.
- 5.6.10 Contact the Site Manager, or his *designee*, for final inspection of the vehicle, cargo and paperwork.
- 5.6.11 Insure that the carrier (vehicle operator) has all the required shipment papers, and appropriate copies have been retained for the site files.
- 5.7 For packages shipped as other than exclusive use, ensure completion of the following:
 - 5.7.1 Certification statement of 49 CFR 172.204: "This is to certify that the above-named materials are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation," appears on the shipping paper and is signed by the Site Manager or his *designee*.
 - 5.7.2 Package external radiation level is less than 200 mR/hr contact and 10 mR/hr at one meter.
 - 5.7.3 Package external contamination level does not exceed 2200 dpm/100 cm² β and 220 dpm/100 cm² α .
 - 5.7.4 If the radiation level on the external surface of the package is greater than 0.5 mR/hr and less than 50 mR/hr, and the radiation level at 1 meter is less than 1 mR/hr the package may be shipped as a Radioactive Yellow II shipment.

Ensure that the shipping container meets the DOT Specification 7A Type A general packaging requirements per 49 CFR 173.415.

- 5.7.5 If a Radioactive Yellow II label is required, record the package contents (radionuclides), number of curies, and TI on the label. Affix label to two opposite sides of the package (excluding the bottom) near the proper shipping name.
- 5.7.6 Package is marked correctly in accordance with 49 CFR 172 Subpart D.
- 5.7.7 Ensure vehicle radiation and contamination surveys have been performed.
- 5.7.8 Placarding requirements in Subpart F of 49 CFR 172 are met.
- 5.7.9 Final inspection of the vehicle, cargo, and paperwork is performed by Site Manager, or his *designee*.
- 5.7.10 For *radioactive* waste shipments, the disposal facility operator is required to acknowledge receipt within one week by returning a signed copy of the manifest.
- 5.8 For shipments of railcars to the *disposal* facility of Envirocare of Utah, refer to 2.15 above.
- 5.9 ***Laundry shipments (e.g. used personnel protective equipment)***
 - 5.9.1 ***Used coveralls and rubber boots shall be packaged in plastic bags, at the Contamination Reduction Zone, prior to shipment. HP Technicians shall perform a radiation and loose surface contamination survey on each plastic bag.***
 - 5.9.2 ***The loose surface contamination level shall be less than 33dpm/100 cm² \propto gamma.***
 - 5.9.3 ***If the radiation level is equal to or less than 360 cpm the laundry is not considered radioactive and therefore can be shipped as a non-radioactive shipment. If the radiation level is greater than 360 cpm, contact the HP Supervisor to determine the way the laundry is to be shipped.***
 - 5.9.4 ***The HP technicians shall assist the driver in loading the truck.***
 - 5.9.5 ***The HP technician shall initiate a bill of lading stating that the laundry is not radioactive material but contains small amounts of thorium tailings.***

ATTACHMENT 1

STRAIGHT BILL OF LADING - SHORT FORM - Original - Not Negotiable

RECEIVED, subject to the contract in effect on the date of the issue of this Bill of Lading

From: KERR-McGEE CHEMICAL CORPORATION

the property described below in apparent good order, marked, consigned, and destined as indicated below, which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination. It is mutually agreed, as to each carrier of all or any of said property over all or any portion of said route to destination, and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all terms and conditions of the contract in effect on the date of the issue of this Bill of Lading

SHIPMENT
NUMBER

FULL NAME OF SHIPPER:

Kerr-McGee Chemical Corporation

CARRIER:

TRUCK #:

DATE:

FROM NO.
STATION:
STATE

SHIPPED FROM:

CONSIGNEE TO:

ROUTE:

DELIVERING CARRIER:

This material is routed "exclusive use". The vehicle is to remain closed between origin and destination. No material may be added to the vehicle or removed from the vehicle in route.

LINE NO.	DESCRIPTION AND CLASSIFICATION	ESTIMATED QUANTITY
	(Proper Shipping Name, Reportable Quantity, if applicable/ Hazard Class) (Proper UN identification number) (Net activity in each package) (Principal Radionuclides) (Physical and chemical form of material) (Indicate Yellow II on any applicable packages)	

TRUCK SHIPMENTS: PLACARDS REQUIRED

THIS IS TO CERTIFY THAT THE ABOVE-NAMED MATERIALS ARE PROPERLY CLASSIFIED, DESCRIBED, PACKAGED, MARKED AND LABELED AND ARE IN PROPER CONDITION FOR TRANSPORTATION ACCORDING TO THE APPLICABLE REGULATIONS OF THE DEPARTMENT OF TRANSPORTATION.

KERR-McGEE CHEMICAL CORPORATION
 Shipper Permanent post office address of shipper,
 Oklahoma City, OK 73125

PER

PER

AGENT

ATTACHMENT 2

KERR-MCGEE CHEMICAL CORPORATION

EMERGENCY RESPONSE INFORMATION

Shipment I.D. No. _____

1. Proper Shipping Name and Hazard Class

(Check (✓) one of the two types listed below)

_____ Radioactive Material, Low Specific Activity, n.o.s. - Radioactive Material UN 2912

_____ Radioactive Material, n.o.s. - Radioactive Material UN 2982

DRIVER EMERGENCY PROCEDURE

- A) RESCUE and LIFESAVING may be done with little fear of the hazards from the cargo on this truck. If possible, avoid breathing dust from any spilled cargo.

DO NOT DELAY RESCUE EFFORTS!

- B) After providing needed rescue, lifesaving, first aid or fire-fighting, please read the attached instructions in the event of cargo spillage.

TO THE DRIVER:

Keep these emergency procedures with your shipping papers.

By my signature I certify that I have read and understand these emergency procedures.

Driver's Signature: _____

ATTACHMENT 2A
KERR-MCGEE CHEMICAL CORPORATION
EMERGENCY PROCEDURE

This vehicle contains _____ which are contaminated with natural thorium. In the event of an accident involving spillage of *radioactive material*, the following actions are recommended, if appropriate:

1. LIFESAVING, RESCUE AND FIREFIGHTING

This may be done with little fear towards the hazards from the debris contaminated with thorium. If possible, avoid breathing dust and avoid swallowing it. Thorium on the skin or clothing is relatively harmless and simple washing methods will remove it. If you come into contact with the debris, please wait for advice from health officials. To avoid ingestion of thorium, do not eat, drink, or smoke while near the spill.

2. CONTACT THE LOCAL LAW ENFORCEMENT AGENCY

Tell the police of the accident with spillage of "LOW SPECIFIC ACTIVITY" (LSA) radioactive material called natural thorium. Ask them to notify the state health department. Give them the location of the accident site and tell them of any injuries to persons.

3. Fill Out Attached Questionnaire

Please obtain all of the information asked for on the attached form. You will need to relay this information to the carrier and the shipper.

4. Telephone the Carrier and Shipper (call collect)

a) The Trucking Carrier is _____
Telephone No. _____

b) The Shipper is: Kerr-McGee Chemical Corporation
Telephone No. _____

Read the completed questionnaire to whomever answers your calls. It may be necessary to read the questionnaire a second time for complete understanding.

5. When Help Arrives Please cooperate with all Civil Authorities and Carriers and Shipper's personnel who arrive at the scene. Follow their health-safety instructions for checking possible contamination of your clothing or body.

Please be assured that your exposure to this material will be relatively harmless, particularly if you have followed these instructions. The health and safety personnel who will arrive will be glad to answer any questions you have about this matter.

ATTACHMENT 2B
KERR-MCGEE CHEMICAL CORPORATION
EVALUATION QUESTIONNAIRE

1. Name of truck driver _____
2. Name of trucking company _____
3. Bill of lading number _____
4. Destination of shipment _____
5. Date and time of accident _____
6. Place of accident _____
7. Name of Police Dept. notified _____
8. Phone No. of Police notified _____
9. ~~Is the~~ driver injured? _____ Others? _____
10. Is or was there a fire ? _____
11. Is the truck road worthy? _____
12. Are boxes off of the truck? _____ How many? _____
13. Estimate the number of square feet of spilled material _____
14. Has the spill been covered? _____
15. Is the spill on the ground? _____ Pavement? _____
16. Is the spill in water? _____ Lake? _____ Stream? _____
17. Is the spill near a building? _____ Sewer? _____
18. Is the accident place illuminated at night? _____
19. Other comments: _____
20. Where can you be reached by phone?
 - a) Near the accident site _____
 - b) Home or business phone _____
 - c) Your name: _____

ATTACHMENT 3

RADIOACTIVE WASTE SHIPMENT CHECKLIST

DATE _____

BY _____

SHIPMENT No. _____

CONSIGNEE _____

NOTE: Initial each statement *as being completed* or fill in the blank *with appropriate comment(s)*. N/A is acceptable for those steps not required for this particular shipment.

1. General description _____
2. Consignee license reviewed and consignee authorized to receive type and quantity of material in shipment. _____
3. Number of packages in shipment. (Indicate number of packages of each type of waste.) _____
4. All containers inspected by Site Manager, or *designee*, to ensure compliance with all applicable laws, rules and regulations, including: labeling, obliteration of old markings, *rad*waste classification/stability, gross weight, and package specifications. _____
5. A determination has been made whether or not any package in this shipment is a Reportable Quantity. _____
6. If this is an "Exclusive Use" shipment, the packages are loaded and blocked and braced or otherwise restrained to prevent movement. _____
7. Placard the vehicle per Subpart F of 49 CFR 172. For ~~tractor-trailers~~, placard each side of the trailer and place one on the front of the tractor. For rail shipments, a placard must be visible on each side of a rail car not coupled to another car. _____
8. If applicable, the required tamper proof seals are installed. _____
9. *KMCC's Straight Bill of Lading- Short Form, (attachment 1)* has been completed. Normal copy distribution if applicable is as follows:
 - a. *WCP Project* files.
 - b. With shipment, *Note: if radwaste material*, the copy goes in the disposal site paperwork package.
 - c. With driver paperwork package.

NOTE: The following step applies to *shipments for disposal at the* Envirocare of Utah facility only.

10. The Envirocare of Utah facility's *Radioactive Waste Shipment Record*, is complete. _____

Copy distribution:

- a. Original with shipment paperwork package.
- b. Copy with driver paperwork package.
- c. Copy to *WCP Project* files.

11. The "EXCLUSIVE USE" Vehicle Instructions to Carrier, (*attachment 6*), has been completed. _____

Copy distribution:

- a. Original with drivers paperwork package.
- b. Copy with shipment paperwork package.
- c. Copy to *WCP Project* files.

12. *Deleted*

13. Radiation surveys have been performed.

Copy distribution:

- a. Original to *WCP Project* files.
- b. Copy with driver's paperwork package.

13. Receipt of *radwaste* material has been acknowledged by the disposal site operator *within allotted time (20 days)*. _____

Copy distribution:

- a. Original with shipment paperwork
- b. One copy with driver's paperwork
- c. One copy to *WCP Project* files

15. Vehicle check performed.

16. ***Deleted***

Reviewed by: _____ *Date* _____
Site Manager or Designee

ATTACHMENT 4

SHIPMENT CERTIFICATION

Shipment # _____

**THIS PACKAGE CONFORMS TO THE CONDITIONS AND LIMITATIONS SPECIFIED
IN 49 CFR 173.421 FOR RADIOACTIVE MATERIAL, EXCEPTED PACKAGE - LIMITED QUANTITY OF
MATERIAL, N.O.S., UN 2910.**

Signature/Date
KERR-MCGEE CHEMICAL CORPORATION
WEST CHICAGO, ILLINOIS

ATTACHMENT 5
KERR-McGee CHEMICAL CORPORATION
WEST CHICAGO FACILITY

SHIPMENT LOAD DIAGRAM - TRUCK

SHIPPER	CAB NUMBER	TRAILER NUMBER
SURVEY BY	SHIPMENT NO.	DATE

TRUCK CHECKED FOR CONTAMINATION:

BEFORE LOADING: ☐ $< 2200 \text{ dpm}/100 \text{ cm}^2$ beta-gamma ☐ $< 220 \text{ dpm}/100 \text{ cm}^2$ alpha

☐ CONTAMINATED TO

RADIATION LEVEL, MR/hr	CONTAMINATION LOCATION
------------------------	------------------------

AFTER LOADING: ☐ $< 2200 \text{ dpm}/100 \text{ cm}^2$ beta-gamma ☐ $< 220 \text{ dpm}/100 \text{ cm}^2$ alpha

<p>Left Side</p> <p>Surface _____ mR/hr</p> <p>6' _____ mR/hr</p>	<p>Cab _____ mR/hr</p> <p>(Sleeper)</p>	<p>Front of Van</p> <p>Surface _____ mR/hr</p> <p>6' _____ mR/hr</p>
		<p>Right Side</p> <p>Surface _____ mR/hr</p> <p>6' _____ mR/hr</p>
		<p>Top of Truck</p> <p>Surface _____ mR/hr</p> <p>6' _____ mR/hr</p>
		<p>Under Truck</p> <p>Surface _____ mR/hr</p>
		<p>Rear Surface _____ mR/hr</p> <p>6' _____ mR/hr</p>

ATTACHMENT 6
KERR-MCGEE CHEMICAL CORPORATION
"EXCLUSIVE USE" VEHICLE INSTRUCTIONS TO CARRIER

SHIPMENT NO. _____ DATE _____

1. This shipment of radioactive material is being transported as an EXCLUSIVE USE shipment, loaded by Kerr-McGee Chemical Corporation (the consignor) and may only be unloaded under the direction of the consignor or consignee [49 CFR 173.403 (i)].
2. Any removal, addition to, or movement of, any material in this shipment by anyone, except under the direction of the consignee or consignor, shall constitute a violation of federal law.
3. A closed van shipment shall not be opened, nor shall any shipment be changed or modified in any manner, except by the consignee, without the prior authorization of Kerr-McGee Chemical Corporation. No change of tractor is authorized without prior approval of Kerr-McGee Chemical Corporation. Do not move the 5th wheel of the tractor once the shipment has left the Kerr-McGee West Chicago site.

In the event of an emergency, accident, or contemplated deviation from any of the above instructions, notify Kerr-McGee Chemical Corporation at: () _____ - _____. Routine inspection of placarding is required at all "off the road" stops.

Kerr-McGee Chemical Corporation Authorization

Signature

Date

CARRIER ACKNOWLEDGEMENT:

I have read and understand the foregoing instructions. I agree that this shipment will be made in full accordance with these instructions.

Signature

Date

Print Name

LINDSAY LIGHT II SITE

Standard Operating Procedure

Title: Surveys for Surface Contamination and Release of Equipment for
Unrestricted Use

Document Number: SOP-LLII345

Revision Number: 0

Approved By:

Date: July 25, 1996

Replaces: None

SURVEYS FOR SURFACE CONTAMINATION AND RELEASE OF EQUIPMENT FOR UNRESTRICTED USE

1.0 SCOPE

1.1 Purpose

This procedure *provides* the methods for the detection and measurement of radioactive contamination within the site areas, *it provides* the methods for evaluating contamination, and establishes the criteria for releasing equipment or materials out of the Exclusion Zone. These *methods are to be used* to minimize the spread of radioactive contamination.

1.2 Applicability

This procedure applies to surveys that are performed on building surfaces, vehicles, equipment, materials (herein referred to as equipment) at the site and to the *site* personnel, who are required to monitor and release the equipment.

2.0 REFERENCES

- 2.1 32 Illinois Administrative Code, Parts 310 and 340, Standards for Protection Against Radiation
- 2.2 32 Illinois Administrative Code, Part 400, Notices, Instructions and Reports to Workers; Inspections
- 2.3 West Chicago Project, Health and Safety Plan for Decommissioning Activities at the Kerr-McGee Chemical Corporation Rare Earths Facility, West Chicago, Illinois
- 2.4 NUREG CR5849 Manual for Conducting Radiological Surveys in Support of License Termination
- 2.5 State of Illinois Department of Nuclear Safety License Number STA-583

3.0 DEFINITIONS

3.1 Beta-Gamma to Alpha Decay Ratio

A thorium-232 decay series produces about 0.5 beta-gamma decays for every one alpha decay. This ratio allows the limits for alpha contamination to be verified using beta-gamma survey instruments.

Clean Area defn

3.2 Clean Area

This term defines radiation conditions within a specified area. An area where the radiation levels and contamination levels are maintained below 2 mrem/hr and 33 dpm/100 cm² alpha respectively.

3.3 Contamination Surveys

An assessment that may include, as appropriate, surveys for loose and fixed contamination through the use of direct frisks, large area wipes and smears, to locate and quantify the radioactive material present.

3.4 Exclusion Zone

The area on one side of the Control Line that includes Contamination Control Areas, Radiation Areas, and Airborne Radioactivity Areas.

3.5 Large Area Wipes

Paper towels or maaslin used to wipe large areas to identify the presence of loose contamination.

3.6 Lower Limit of Detection (LLD)

The smallest amount of a radionuclide in a sample that will be detected with a probability of non-detection (Type I error) while accepting a probability of erroneously detecting that radionuclide in a blank sample (Type II error). These probabilities are 0.05 (5% chance of Type I or II errors). See Attachment 5 - "*LLD Calculation*" sheet.

3.7 Smears

Typically 2 inch disk type paper material. Smears are normally taken to identify and quantify loose contamination.

3.8 Unrestricted Release

Release of equipment or materials from the Exclusion Zone to any destination other than a licensed facility.

4.0 REQUIREMENTS

4.1 Prerequisites

4.1.1 Health Physics personnel shall ensure that all portable survey equipment used for this procedure are properly functioning and have a valid calibration sticker.

4.1.2 ***The Health*** Physics Supervisor or designee shall ensure that all personnel who are required to perform this procedure are properly trained and understand this procedure.

4.1.3 Equipment, vehicles and areas should be free of visible dirt, mud or dust prior to performing a contamination survey.

4.2 Tools, Material, Equipment

4.2.1 The following counting equipment, or their equivalents, should be used for performing contamination surveys on equipment and materials:

- Eberline PAC-4G gas proportional survey meter coupled to an AC-21 probe or equivalent.
- Eberline PRM6 rate meter coupled to an HP-210 shielded GM detector or equivalent.
- Gamma Products G5000 automatic alpha/beta counting system or equivalent.
- Eberline E-530 survey meter with an HP-270 tissue equivalent GM detector or equivalent.
- Eberline RD-14 Alpha counting system or equivalent.

4.2.2 Survey Maps (or lists) should be produced for each applicable type of equipment. Sketches of building surfaces (walls, floors, etc.), identifying the surveyed grids, should be produced for each surveyed building.

4.3 Precautions, Limits

4.3.1 Direct and removable surveys should not be performed on wet surfaces, for alpha contamination. Wet surfaces should be surveyed only for beta-gamma contamination. ***The Health Physics Supervisor shall make the final determination as to when a wet surface is to be surveyed. Attachment 6 (Beta-Gamma Survey of Truck Tires) shall be used as a guideline for release criteria, when performing surveys on wet surfaces.***

4.4 Acceptance Criteria

4.4.1 Prior to unrestricted release from the Exclusion Zone, all vehicles, equipment and materials shall be surveyed for contamination. If contamination is found, then the vehicle, equipment, or material should be decontaminated in order to be within the applicable ***surface*** contamination release limits ***per Attachment #3.***

- 4.4.2 The release of items from clean areas within the Exclusion Zone will be controlled by specific criteria established on a case by case basis and approved by the *Health Physics Supervisor*.

5.0 PROCEDURE

5.1 Routine *Surface* Contamination Surveys

- 5.1.1 Routine surveys shall be performed by *trained personnel (typically by Health Physics Technicians)*, in accordance with *this procedure and as* scheduled by the *Health Physics Supervisor*.
- 5.1.2 *Routine contamination surveys are not required in the Exclusion Zone.*
- 5.1.3 *Support Zone and Contamination Reduction Zone* shall be surveyed at least weekly to ensure that cross contamination is not occurring. The clean side of *the Contamination Reduction Zone* should be surveyed each work day.
- 5.1.4 Other surveys will be performed, as appropriate, to support Special Work Permits, the movement of equipment from radioactive material areas to clean areas, and to evaluate radiological conditions in specific work areas when directed by the *Health Physics Supervisor*.

5.2 *Support/ Contamination Reduction Zone- Surface Contamination Surveys*

- 5.2.1 Survey techniques may employ the use of large area wipes, smears, or direct frisks as appropriate to the area being surveyed.
- 5.2.2. Large area wipes may be used to assess floor areas for contamination. A sufficient number of large area wipes should be used to evaluate approximately 10% of the floor area being surveyed.
- 5.2.3 If contamination is found with the large area wipes, a more detailed smear survey should be performed.
- 5.2.4 Counter tops, office furniture, laboratory equipment, etc., should be included in the contamination surveys. The area immediately on the clean side of the Control Line should be included in the survey.
- 5.2.5 Smears shall cover approximately 100 cm² and should focus on areas with the highest potential for removable contamination. The smears should be placed in an envelope that is labeled with a *sequential* number corresponding to the *Smear Number* on the "Radiological Survey Data Sheet -*West Chicago Facility*" (see *Attachment I*).
- 5.2.6 The smears shall be analyzed for alpha contamination.

5.2.6 The smears shall be analyzed for alpha contamination.

5.3 Equipment- *Surface Contamination Surveys*

5.3.1 Equipment shall be surveyed for contamination by using large area wipes, smears and by direct frisk as appropriate.

5.3.2 Take an appropriate number of smears to adequately assess the radiological conditions of the item being surveyed.

5.3.3 A large area wipe may be used as an indication of the presence of contamination.

5.3.4 Smears shall cover approximately 100 cm² and should focus on areas with the highest potential for removable contamination. The smears should be placed in an envelope that is labeled with a *sequential* number corresponding to the *Smear* Number on the "Radiological Survey Data Sheet -*West Chicago Facility*" (see *Attachment 1*).

5.3.5 The smears shall be analyzed for alpha contamination.

5.4 *Unrestricted Release*

5.4.1 Materials, equipment and vehicles shall be surveyed for contamination prior to unrestricted release from the site, using large area wipes, smears, and by direct frisk.

5.4.2 All building surfaces, large concrete pieces, and other materials having large, smooth surfaces shall be surveyed *prior to unrestricted release*. A sufficient number of large area wipes and/or smears shall be taken to adequately assess any contamination *present*.

5.4.3 All equipment intended for unrestricted release *from contaminated areas* shall be surveyed for removable and fixed contamination. A sufficient number of large area wipes and/or smears shall be taken to adequately assess any contamination *present*. If removable contamination is within the release criteria, then perform a direct alpha frisk. Particular attention should be given to areas of the vehicle most likely to have become contaminated such as tire exterior surfaces, occupied areas, load areas, wheel wells, and the bottom of the *equipment*.

5.4.4 Vehicles intended for unrestricted release *from* contaminated areas shall be surveyed for removable contamination with large area wipes. If no contamination is found, take a confirmatory smear to document each large area wipe. If contamination is found, take an appropriate number of smears to evaluate the removable contamination present. If removable contamination is within the release criteria, then perform a direct alpha frisk. All survey results must be *documented*.

- 5.4.5 Vehicles intended for unrestricted release from clean areas in the Exclusion Zone shall be surveyed with large area wipes on accessible tire/track surfaces, with a direct frisk of tire/track surfaces, and with one smear each for two tires. The results of the direct frisk and the large area wipes must indicate that the release criteria is met. The smears shall be added to the survey documentation when the results become available.
- 5.4.6 Large area wipes may be used as an indication of the presence of contamination.
- 5.4.7 If no contamination is found with a large area wipe, a confirmatory smear shall be taken for documentation.
- 5.4.8 If contamination is found with the large area wipe, a representative number of smears shall be taken to quantify the removable contamination present.
- 5.4.9 Smears shall cover approximately 100 cm² and should focus on areas with the highest potential for removable contamination. The smears should be placed in an envelope that is labeled with a *sequential* number corresponding to the *Smear Number* on the "Radiological Survey Data Sheet-*West Chicago Facility*" (see *Attachment 1*).
- 5.4.10 The smears shall be transported to the *Site* Laboratory for analysis.
- 5.4.11 Perform a direct frisk on all material being surveyed for unrestricted release.
- 5.4.12 Personal equipment and articles (radios, pens, paper, clipboards, etc.) can be surveyed with either the large area wipes or by direct frisk, as appropriate.

NOTE

Items that have irregular surfaces, such as radios, should be wiped and frisked. Items with relatively smooth surfaces, such as paper, pens, etc., may be direct frisked only.

5.5 Documentation of Results

- 5.5.1 The smear counting results and data shall be documented on the "Radiological Survey Data Sheet-*West Chicago Facility*" (see *Attachment 1*). The documentation of the release survey shall include a drawing of the item to be released.
- 5.5.2 The instructions for completion of the Radiological Survey Data Sheet are contained in Attachment 2.
- 5.5.3 *A request for equipment release form (Attachment 7) shall be initiated by the*

equipment owner to track the decontamination process.

6.0 RECORDS/REPORTS/NOTIFICATIONS

- 6.1 The *Health Physics Supervisor and the Site Manager (RSO)* shall review and approve all completed *survey* forms required by this procedure, *to comply with reference 2.5 above.*
- 6.2 The survey maps shall be uniquely numbered and retained *by Health Physics for project filing.* Single item survey maps shall be attached to the survey results.

7.0 ATTACHMENTS

- 7.1 Attachment 1 Radiological Survey Data Sheet -*West Chicago Facility(example)*
- 7.2 Attachment 2 Radiological Survey Data Sheet Instructions (*2 pages*)
- 7.3 Attachment 3 Surface Contamination Release Limits
- 7.4 Attachment 4 Large Area Wipes on Truck Tires
- 7.5 Attachment 5 LLD Calculation
- 7.6 *Attachment 6 Beta- Gamma survey of Truck Tires (wet surfaces)*
- 7.7 *Attachment 7 Request For Equipment Release*

ITEM DESCRIPTION	00 __ Vehicle		98 __ Equipment		__ __ Building		99 __ Other	
REFERENCE #	TS	MO	DAY	ITEM	NO.	PERFORMED BY		
ALPHA SURVEY INSTRUMENTATION					BETA SURVEY INSTRUMENTATION			

[illegible]

REVIEWED BY:	DATE:
--------------	-------

Attachment 2

RADIOLOGICAL SURVEY DATA SHEET INSTRUCTIONS

1. Select the appropriate survey category.
2. Enter the purpose of the survey in the "ITEM DESCRIPTION" section. Be specific:
 - Vehicle survey for release from the site.
 - Tools and equipment for use in the clean area.
 - SWP support, include the SWP number.
3. Enter the survey date.
4. Enter the reference number - Year, Month, Date, Item (Use coding for categories at the top of the form) and Number (Individual survey number issued to each technician by Kerr-McGee).
5. Enter your signature in the "PERFORMED BY" section.
6. Enter the instrument(s), serial number(s), and background reading(s) for the survey instruments used for this survey.
7. Enter the "LOCATION OF READING." Enter descriptions such as, the location and item being surveyed, vehicle number, smear location on vehicle, etc.
8. Enter the number of the smear or large area wipe in the "SMEAR NUMBER" section.
9. All data in the "ALPHA ACTIVITY" section is recorded in dpm/100cm², except large area wipe data.
 - If equipment/material is directly frisked, the reading from the PAC-4G is converted to dpm/100cm² by multiplying ccpm by a factor of 4 (Gross cpm - Background cpm X 4) and enter the result in the "DIRECT" column. If the instrument response cannot be distinguished from background enter <200 dpm/100cm².

Attachment 2 (Cont.)

RADIOLOGICAL SURVEY DATA SHEET INSTRUCTIONS

- The "REMOVABLE" column may contain the result from a smear or the result from a large area wipe. Smear results that are less than the LLD shall be recorded as less than the numerical LLD value for the instrument in use. As an example, if the LLD for the G5000 is 3 dpm, then the result will should be recorded as <3 dpm/100cm². All results should be rounded to the nearest whole number. Results from LAWS should be recorded as dpm without regard to area, unless specific instructions are given to calculate the result per area, as in Attachment 4. Results that do not exceed background should be recorded as BKG (Background).
 - Fixed contamination is the difference between the direct frisk results and the removable contamination results. If no fixed contamination is detectable, enter N/A in the "FIXED" column.
10. If a "BETA-GAMMA DIRECT" survey is performed, record the results as ccpm.
11. In the "REMARKS" section, record any identifying data on counting equipment and any other information needed for explanation or interpretation of survey data. If large area wipes are included in the removable contamination data without regard to area, note this in the "REMARKS" section.

Attachment 3

SURFACE CONTAMINATION RELEASE LIMITS

Average ^a Removable (dpm/100 cm ²)	Maximum Removable (dpm/100 cm ²)	Average ^a Fixed (dpm/100 cm ²)	Maximum Fixed (dpm/100 cm ²)
33	100	1,000	5,000
Equivalent Beta-Gamma Measurements ^{b,c}			
17	50	500	2,500

These are the limits - use all limits

- ^a The contamination levels may be averaged over one (1) square meter provided the maximum activity per any 100 cm² area within the one (1) square meter is less than the maximum applicable release limit.
- ^b Beta-gamma release limits derived from the beta-gamma to alpha ratio.
- ^c Beta-gamma surveys are not normally performed for release purposes. If alpha contamination is verified to be within specified release limits, the alpha to beta-gamma ratio indicates that the beta-gamma is also within limits.

Beta-gamma frisks may be used as appropriate to:

- Estimate contamination levels prior to performing release surveys.
- Estimate levels of contamination present on equipment, materials and work areas.

The results of direct beta-gamma frisks should be quantified on survey records as CCPM (Corrected Counts Per Minute).

Results that are less than 100 CCPM should be recorded on the survey record as <100 CCPM.

Attachment 4

LARGE AREA WIPES ON TRUCK TIRES

Large area wipes are used to wipe an area of approximately 2000 cm² on truck tires. The wipes are then frisked with a PAC-4G.

Assuming that 50 cpm above background is readable, it can be assumed that 100 dpm is detectable on a wipe. If the area of the wipe requires two probe areas to cover the wipe, then it can be assumed that we can assess with each measurement approximately half of the total area wiped, or 1000 cm², or approximately 100 dpm/1000 cm², which is equivalent to 10 dpm/100cm².

Frisk results on LAWs, from truck tires, that are nondetectable may be recorded as <10 dpm/100cm² in the removable column of the survey report.

ATTACHMENT 5

LLD CALCULATION

$$LLD = \frac{2.71}{T_s} + 3.29 \sqrt{\left(\frac{C_b}{T_b}\right) \left(1 + \frac{T_b}{T_s}\right)}$$

Where C_b = Background Counts Per Minute
 T_b = Background Counting Time in minutes
 T_s = Sample Counting Time in minutes

EXAMPLE: The background count rate for a given counter is 1.56 cpm over a 50 minute counting time and samples are counted for 2 minutes. The counter has an efficiency of 40.3%.

$$LLD = \frac{2.71}{2} + 3.29 \sqrt{\left(\frac{1.56}{50}\right) \left(1 + \frac{50}{2}\right)}$$

$$LLD = 4.32 \text{ cpm}$$

$$LLD = \frac{4.32 \text{ cpm}}{.403} = 10.7 \text{ dpm}$$

ATTACHMENT 6

Beta-Gamma Survey of Truck Tires

Attachment 1
No Table 119

49 cFR 173.443 (Table 11)

per 100 cm²

The removable contamination limits are 220 dpm alpha contamination and 2200 dpm beta contamination. The most restrictive is the alpha limit. If weather prevents surveying for alpha contamination then beta-gamma surveys will have to be utilized. ~~From attachment 1 table 1~~ the alpha to beta ratio is 1.8. Using a conservative alpha to beta ratio of 2, the beta equivalent activity for the alpha limit would equal 110 dpm. 110 dpm times the probe efficiency of 0.14 cpm/dpm equals 15.7 cpm. 15.7 cpm above background is not discernable in the field. The diameter of a truck tire is 43 inches. The tread width is 9 inches. The surface area of a truck tire equals 7843.8 cm². Approximately 12 inches of tread is on the ground and not surveyable. This represents 3.5% of the surface area of the tire. The remaining 96.5% equals a surface area of 7569.5 cm². The typical area of contact for a wipe is about 3.5 inches by 4 inches. This is equal to about 90 cm². If the conservative area of 100 cm² is used the each cm² of wipe is equal to 57.7 cm² of tread area. The manufacturer lists the surface area of the probe face as 15.5 cm². The tread area survey under the probe equals 894.4 cm². To correct the measured counts to an activity/100 cm² the counts indicated on the meter face must be multiplied by 8.9. If 15.7 cpm/100 cm² beta-gamma activity equals 220 dpm/100 cm² alpha contamination then the measured cpm when surveying a wipe would equal 139 cpm. The manufacturer recommends limiting the background count rate to less than 300 cpm in order to see 100 cpm above background. Due to the changing background conditions this value is being reduced to 200 cpm. Therefore if background is 200 cpm or less and the wipe on a truck tire reads less than 100 cpm above background the truck tire has less than 220 dpm/100 cm² removable alpha contamination.

**ATTACHMENT 7
REQUEST FOR EQUIPMENT RELEASE**

FROM: _____ **DATE:** _____

TO: HEALTH PHYSICS SUPERVISOR

1. Equipment type & ID #: _____

2. Usage history (locations on site): _____

3. Scheduled date to start decontamination: _____

4. HP check for survey readiness:: Technician: _____ **date:** _____

5. Equipment ready for survey: YES: _____ **NO:** _____

Actions required: _____

6. Date & Time ready for survey: _____

7. Survey date & time: _____

results: Pass: _____ **fail:** _____

8. equipment release date: _____

9. Approved for release: HP supervisor: _____ **date:** _____

NOTE: On large earth moving equipment, substantial cleaning may be required prior to HP checking for survey readiness. Once vehicle has been checked and is ready for release survey, it may take as much as 24 hours from the time the survey is initiated until survey results are available. If fixed or removal is located, additional decontamination and surveys are required.

LINDSAY LIGHT II SITE

Standard Operating Procedure

Title: Decontamination

Document Number: SOP-LLII347

Revision Number: 0

Approved By:

Date: July 25, 1996

Replaces: None

DECONTAMINATION

1.0 SCOPE

1.1 Purpose

The purpose of this procedure is to provide instructions for the decontamination of personnel and equipment.

1.2 Applicability

This procedure is applicable for all equipment and personnel that may become contaminated at the Kerr-McGee West Chicago Facility.

2.0 REFERENCES

- 2.1 32 Illinois Administrative Code, Parts 310 and 340, Standards for Protection Against Radiation
- 2.2 32 Illinois Administrative Code, Part 400, Notices, Instructions and Reports to Workers; Inspections
- 2.3 West Chicago Project, Health and Safety Plan for Decommissioning Activities at the Kerr-McGee Chemical Corporation Rare Earths Facility, West Chicago, Illinois
- 2.4 Kerr-McGee Procedure *WCP-345* "Surveys for Surface Contamination and Release of Equipment for Unrestricted Use"

3.0 DEFINITIONS

3.1 Airborne Radioactivity Area

This term defines radiation conditions within a specified area. An area where the average concentration of airborne radioactivity could allow an individual to exceed 12 DAC-hrs over a one week period.

3.2 Clean Area

This term defines radiation conditions within a specified area. An area where the radiation levels and contamination levels are maintained below 2 mrem/hr and 33 dpm/100 cm² alpha respectively.

3.3 Contamination Control Area

This term defines radiation conditions within a specified area. An area that may be contaminated to a level greater than a Clean Area.

3.4 Contamination Reduction Zone

The area on one side of the Control Line where personnel can decontaminate, remove their personal protective clothing and equipment. (See "Support Zone Layout" drawing #200-CV-007.)

3.5 Control Line

The demarcation that separates a Clean Area from a Contamination Control Area. The control line is located in the personnel decon facility.

3.6 Craft Personnel

Employees and contractors who physically perform the activities described on the SWP.

3.7 Derived Air Concentration-Hour (DAC-hour)

DAC-hour is the product of the concentration of radioactive material in air and the time of exposure to that radionuclide.

3.8 Exclusion Zone

The area on one side of the Control Line that includes Contamination Control Areas, Radiation Areas, and Airborne Radioactivity Areas.

3.9 Film Badge

Similar to the TLD, it is used to measure radiation dose.

3.10 Frisking

A personal survey of an individual's clothing and exposed body performed to determine if contamination is present.

3.11 Protective Clothing

Reusable or disposable coveralls, boots and gloves that provide a barrier between contamination and personnel.

3.12 Radiation Area

This term defines radiation conditions within a specified area. An area where the whole body radiation level is greater than 5 mrem/hr.

3.13 Special Work Permit (SWP)

A document which describes the radiological conditions of the work area or task and delineates safety and radiation protection requirements to be followed in the work area or when performing the task.

3.14 Support Zone

The area on one side of the Control Line at the entrance to the Exclusion Zone. (*See "Support Zone Layout" drawing #200-CV-007.*)

3.15 Thermoluminescent Dosimeter (TLD)

A device that measures radiation dose.

4.0 REQUIREMENTS

4.1 Prerequisites

None.

4.2 Tools, Material, Equipment

4.2.1 Decontamination facility.

4.2.2 Soap, water, high pressure spray, scrub brushes and other material as necessary to decontaminate personnel and equipment.

4.3 Precautions, Limits

Decontamination of personnel with material other than soap and water will only be done when authorized by the Site Manager, Health Physics Supervisor, or a medical doctor.

4.4 Acceptance Criteria

4.4.1 Personnel shall be free of contamination after decontamination.

4.4.2 Material and equipment *being decontaminated, for unrestricted release, shall meet the release limits established in Reference 2.4.*

5.0 PROCEDURE

5.1 Personnel Decontamination

5.1.1 Personnel who are contaminated to greater than 100 ccpm shall notify the health physics technician (HPT) assigned to the Control Line.

5.1.2 The HPT shall resurvey the individual to determine the exact location of the contamination and document it on the Contaminated Personnel or Personal Effects Report (Attachment 1).

5.1.3 If the contamination is spotty, the HPT shall attempt to decontaminate the individual using swabs or soap and water. If the decontamination is successful, document the results on Attachment 1.

a. *If contamination is determined to be in an individual's eyes, the eyes may be flushed, using an eye wash station.*

b. *If contamination remains in the eyes after flushing or is determined to be in an individual's nose or ears, decontamination will be performed under the direction of the Health Physics Supervisor or qualified medical personnel.*

c. Cleansing methods for skin decontamination, in order of harshness are as follows:

1. Lifting off with sticky tape.
2. Flushing with water.

3. Soap and cool water.
4. Mild abrasive soap, soft brush, and water.
5. Detergent (soap powder).
6. Mixture 50% powdered detergent and 50% cornmeal.

5.1.4 If the contamination cannot be easily removed or the contamination is wide spread, the HPT shall escort the individual to the decontamination facility and notify the Health Physics Supervisor and the Site Manager.

5.1.5 The contamination shall be removed by having the individual wash with soap and cool water several times if necessary. The methods listed above may be used by the HPT.

5.1.6 If the decontamination is successful, document the results on Attachment 1.

5.1.7 If, after several attempts, the contamination is not successfully removed, notify the Health Physics Supervisor.

5.2 Tool Decontamination

5.2.1 All tools being removed from the Exclusion Zone shall be checked by the HPT.

5.2.2 Tools that are contaminated shall be decontaminated before they can be released from the Exclusion Zone.

5.2.3 Tools shall be decontaminated by the users under the direction of the HPT.

5.2.4 Tools can be decontaminated using scrub brushes and soap and water, wiping with damp rags or wipes, soaking in a decontamination solution, using abrasive materials ultrasonic cleaners, or any other method approved by the HPT.

5.2.5 All interior surfaces of the tools must be decontaminated as well prior to the tool being unconditionally released.

5.2.6 If the tool is decontaminated and released by the HPT, the survey results shall be documented on a Radiological Survey Data Sheet (Reference 2.4).

5.2.7 If the tool cannot be decontaminated after several tries, then the tool shall be painted or sprayed with yellow paint to indicate that the item is radioactive material and kept in the Exclusion Zone.

5.3 Equipment Decontamination

5.3.1 Heavy equipment, such as backhoes, bulldozers, trucks, cranes, shall be washed with high pressure water spray prior to being surveyed by the HPT.

5.3.2 The washing of heavy equipment shall be performed in an area designated by health physics.

5.3.3 Once the equipment is washed, it will be surveyed by the HPT. The HPT will identify any areas on the equipment that need further decontamination and will make recommendations on how to further decontaminate.

5.3.4 All surfaces of the equipment must be decontaminated and surveyed. This includes air intakes, air filters and any internal surface that is likely to be contaminated.

5.3.5 Once the equipment has been surveyed and released by the HPT, the survey results shall be documented on a Radiological Survey Data Sheet (*Reference 2.4*).

6.0 RECORDS/REPORTS/NOTIFICATIONS

6.1 Release surveys and personnel decontaminations shall be documented on the appropriate form.

6.2 Personal contaminations shall be reported to the Health Physics Supervisor and the Site Manager.

7.0 ATTACHMENTS

7.1 *Attachment 1 Contaminated Personnel or Personal Effects Report*

ATTACHMENT 1

CONTAMINATED PERSONNEL OR PERSONAL EFFECTS REPORT

DATE OF INCIDENT		TIME OF INCIDENT			
NAME		BADGE NO			
LOCATION OF INCIDENT (SPECIFIC AREA)					
DESCRIPTION	DESCRIBE IN DETAIL ANATOMICAL LOCATION, CONTAMINANT, TYPE OF INJURY, OR CONTAMINATED ARTICLE:				
CONTAMINATED ARTICLE OR AREA	DECONTAMINATION AGENT USED	INSTRUMENT	<div style="text-align: center;">SURVEY RESULTS</div> <div style="display: flex; justify-content: space-between; font-size: 0.8em;"> BEFORE AFTER </div>	FINAL DISPOSITION OF ARTICLES	
WOUND COUNT	/5 MIN	BKGD COUNT	/5 MIN	SOURCE COUNT	/5 MIN
SAFETY MEASURES	PERTINENT SAFETY MEASURES IN EFFECT		IF NO, EXPLAIN		
	<input type="checkbox"/> YES <input type="checkbox"/> NO				
REMARKS					
EMPLOYEE SIGNATURE			HEALTH PHYSICS SIGNATURE		

LINDSAY LIGHT II SITE

Standard Operating Procedure

Title: Sample Preparation Procedure for Gamma Spectral Analysis

Document Number: SOP-LLII364

Revision Number: 0

Approved By:

Date: July 25, 1996

Replaces: None

SAMPLE PREPARATION PROCEDURE

1.0 SCOPE

1.1 Purpose

The purpose of this procedure is to provide guidance for the preparation of samples for analysis of moisture or radioactive nuclides.

1.2 Applicability

This procedure applies to all soil-type environmental samples, including, soil, rocks, concrete, and construction debris.

2.0 REFERENCES

- 2.1 32 Illinois Administrative Code, Parts 310 and 340, Standards for Protection Against Radiation
- 2.2 West Chicago Project, Health and Safety Plan for Decommissioning activities at the Kerr-McGee Chemical Corporation Rare Earths Facility, West Chicago, Illinois
- 2.3 State of Illinois Department of Nuclear Safety Radioactive Material License Number STA-583
- 2.4 *West Chicago Project, Facility Procedure #WCP-365 "Moisture Analysis"*
- 2.5 *West Chicago Project, Facility Procedure #WCP-380 "Use of Laboratory Standard Reference Methods Procedure"*

3.0 DEFINITIONS

NONE

4.0 REQUIREMENTS

4.1 Prerequisites

NONE

4.2 Tools, Material, Equipment

4.2.1 The following equipment is needed to perform this procedure:

- a. 20 ml sample vials
- b. A set of sieves ranging from one-inch to 100 mesh.
- c. Bico-Braum Pulverizer
- d. Riffle splitter
- e. *2 qt plastic jars*
- f. aluminum pans
- g. 4-inch Braum-Chipmunk Crusher
- h. analytical balance
- i. Marinelli beakers
- j. zip-lock bags
- k. labels
- l. drying oven

4.3 Precautions, Limits

4.3.1 Personnel are to use extreme caution when using the "Jaw Crusher" and the "Pulverizers" because they can cause a serious injury.

4.3.2 *All samples not known to be homogeneous must be homogenized prior to analysis.*

4.4 Acceptance Criteria

Proper preparation ensures that the samples submitted to the laboratory are representative of the material sampled and suitable for the requested analysis.

5.0 PROCEDURE

5.1 All Samples

5.1.1 All samples are brought to the sample receiving area and the following information is documented in the "Sample Prep Log".

- a. Number of samples**
- b. Originator of samples**
- c. Date received**

5.1.2 If the samples are not uniquely identified, assign a unique number to each sample and identify the number(s) on each sample and in the Sample Prep. Log.

5.1.3 Prepare the sample in accordance with the requirements of the analysis requested.

5.1.4 Sample(s) received for IDNS and/or USEPA are logged as received in the Sample Prep. Log Book. The appropriate agency is notified to pick up the sample(s) from the site laboratory. When samples are picked up, note the date and time in the Sample Prep. Log Book.

5.2 Lot Samples for Railcar shipment.

5.2.1 The lab technician should: log Receipt of Samples from lots in the Sample Prep. Log Book, then sign the associated Sample Tracking Form.

5.2.2 Label appropriate # of Liquid Scintillation Containers (LSC Vials).

5.2.3 Prepare samples to 20 g \pm 0.5 g after homogenizing each sample.

5.2.4 Perform moisture analysis if requested in accordance with reference 2.4.

5.2.5 Perform pH analysis if required in accordance with reference 2.5.

5.3 Shared Samples

5.3.1 If the sample appears to be "dry," divide the sample into 2 or 3 sub-samples (2 if a QA sample is needed; 3 if a QA and an IDNS sample split

is also needed) using the riffle splitter. If the samples appears to be "wet", homogenize and manually divide into 2 or 3 sub-samples

5.3.2 Label *uniquely* each sub-sample *and log the numbers in Sample Prep. Log book.*

5.3.3 *Submit samples for analysis.*

- a. Samples for the soil lab shall be 20 ± 0.5 grams and placed into 20 ml vials *for nutranl analysis.*
- b. Samples for the IDNS shall weigh one if prepared by Kerr-McGee.
- c. Samples placed in Marinelli beakers shall *be in a* 1.00 liter *geometry.*
- d. The net weight of the Marinelli beaker shall be noted on the sample label attached to the beaker. Note: Do not write directly on the beaker.
- e. Samples for an outside laboratory or "reserved sample" shall weigh 1000-1100 grams and be placed *into storage jars and labeled.*

5.3.4 Submit the *vial* samples to the soil lab for gamma pulse height analysis by Nal-NURTANL.

5.3.5 Samples for IDNS shall be submitted to state personnel for analysis.

5.3.6 *If moisture analysis is required perform analysis in accordance with reference 2.4.*

5.3.7 Submit the "Marinelli-beaker" samples for gamma pulse height analysis by GE.

5.3.8 *Place the jar* samples in storage.

5.4 QA Sample

5.4.1 Place the sample in an *tared* aluminum pan and weigh before drying.

5.4.2 Dry the sample for 8-16 hours at 105-110° in a drying oven.

5.4.3 Weigh the sample after drying and calculate the moisture content.

$$\% \text{ Moisture} = \frac{\text{weight of water} * 100}{\text{Net weight as-received sample}}$$

5.4.4 Remove non-native, non-crushable debris (including pieces of metal, wood, etc., but excluding crushable brick, concrete, glass, etc.) and detritus (grass, etc.) from the samples.

5.4.5 Samples must pass through a ¼ inch mesh to be acceptable for gamma spectral analysis. Sample components greater than ¼ inch shall be crushed using a 4-inch chipmunk crusher.

NOTE: If sample contains material greater than ¼" crush to less than ¼" with the chipmunk crusher.

5.4.6 Riffle-split the sample down to 3000-5000 grams for analysis by Marinelli beaker, GE Detector.

5.4.7 Using the Bico-Braum Pulverizer, grind the samples to less than 10 mesh.

5.4.8 Blend the pulverized sample by rolling it *in a jar and place jar in storage for Radon ingrowth.*

5.4.9 *After allowing time for radon in growth, transfer 1.0 liter of material to a Marinelli beaker and determine net weight.*

5.4.10 Transfer 20 ± 0.5 grams into a 20 ml LSV. Cap the LSV tightly. Place the remainder of the material into a two liter polyethylene bottle. Cap the bottle tightly and label "This is a reserve sample".

5.4.11 *Perform Gamma Pulse Height Analysis on samples.*

5.5 *Verification of Samples*

5.5.1 *Transfer equal weight of sample from each grid sample point into bucket.*

5.5.2 *Homogenized sample*

5.5.3 *Fill labeled sample jar with sample*

5.5.4 *Transfer 20.0g \pm 0.5g to label LSC vial.*

5.5.5 *Perform moisture analysis in accordance with reference 2.4.*

5.5.6 *If grid selected for QA Analysis transfer = 3000g of sample to aluminum pan and place into oven for drying.*

5.5.7 *Place jar into storage and submit Lbc vial for Gamma Pulse Height Analysis.*

6.0 RECORDS/REPORTS/NOTIFICATIONS

6.1 Notify the laboratory technician when the samples are properly labeled and ready for analysis.

6.2 Samples shall be retained until all evaluations have been completed and the sample is no longer needed.

6.3 *Log Books shall be maintained by the Lab Supervisor until complete and then forwarded to Document Control for storage in the project files.*

7.0 ATTACHMENTS

NONE

LINDSAY LIGHT II SITE

Standard Operating Procedure

Title: Operation and Calibration of the Model AP210S Ohaus Analytical Plus
Electronic Balance

Document Number: SOP-LLII368

Revision Number: 0

Approved By:

Date: July 25, 1996

Replaces: None

OPERATION AND CALIBRATION OF THE MODEL AP210S OHAUS ANALYTICAL PLUS ELECTRONIC BALANCE

1.0 SCOPE

1.1 Purpose

The OHAUS Model AP 210S Electronic Balance is used for weighing various materials in the counting/soils laboratory in support of sample preparation and analysis. This procedure describes the steps for routine weighing and calibration. Calibrations are performed to ensure accuracy and precision of results.

1.2 Applicability

This procedure applies to the quantitative analysis of materials/sample weight and calibration of the balance.

2.0 REFERENCES

- 2.1 Instruction Manual, OHAUS Analytical Plus Electronic Balances, 1993

3.0 DEFINITIONS

- 3.1 Tare Weight - Weight of sample container, without contents.

4.0 REQUIREMENTS

4.1 Prerequisites

- 4.1.1 Verify cleanliness of or clean pan prior to operating the balance.
- 4.1.2 Auto calibration completed prior to use.
- 4.1.3 If balance is turned off, perform SELF TEST and allow 2 hour warm up time prior to use.

4.2 Tools, Materials, Equipment

- 4.2.1 Weighing dishes, planchets, etc., as required for containment of materials to be weighed.

4.2.2 *Gloves for handling the calibration weight.*

4.2.3 200 gram weight for weekly calibration check.

4.3 Precautions, Limits

4.3.1 Maximum sample weight for this balance is 210 grams.

4.3.2 Check level and adjust as appropriate prior to use.

4.3.3 *Wear gloves when handling calibration weights.*

4.4 Acceptance Criteria

4.4.1 Weekly check weight results within ± 1 % of nominal value.

5.0 PROCEDURE

5.1 Auto Calibration

5.1.1 Access auto calibration menu by depressing ON TARE button until "CAL" is displayed and release the button.

5.1.2 When button is released, "AUTO" will be displayed.

5.1.3 Verify there is no load on the pan, close chamber door and press "ON TARE" to begin.

5.1.4 When the balance is recalibrating, "CAL" will be displayed.

5.1.5 When the calibration is completed, the display will indicate zero and the balance will be in the weighing mode which was last used.

5.1.6 On a weekly basis, weigh the 200 gram check weight upon completion of calibration. If results are outside acceptance criteria, notify lab supervision.

5.2 Weighing Samples

5.2.1 With no load on the pan and the chamber doors closed, switch the display on by pressing "ON TARE".

5.2.2 After completion of display checks, the balance will display zero.

- 5.2.3 Run auto calibration.
- 5.2.4 Press "ON TARE" to rezero balance.
- 5.2.5 Place sample to be weighed on pan.
- 5.2.6 Wait for stability indicator to appear before reading sample weight.

NOTE

The stability indicator is a small circle located in the upper left corner of the display.

- 5.2.7 Record weight in accordance with analytical procedure being performed.
 - 5.2.8 Remove and dispose of sample in accord with analytical procedure.
 - 5.2.9 Rezero, as required, load and weigh next sample.
 - 5.2.10 When all samples have been weighed, clean chamber and scale pan of debris and turn off display by pressing the "OFF" button.
- 5.3 Using the Automatic TARE function.
- 5.3.1 Place empty container on pan, its weight will be displayed.
 - 5.3.2 Press "ON TARE". Display will show zero, indicating the container weight is in memory.
 - 5.3.3 Add materials to be weighed to the container, the NET WEIGHT of the materials will be displayed.
 - 5.3.4 Removing container and material will cause the balance to display the container weight as a negative number.
 - 5.3.5 When sample has been weighed, remove tare weight from memory by pressing "ON TARE".

6.0 RECORDS/REPORTS/NOTIFICATIONS

6.1 Records

6.1.2 Results obtained from performance of this procedure are recorded in accordance with analytical procedures being performed.

6.1.3 Record performance of weekly calibration check in Lab Routine Sheet.

6.2 Reports

None.

6.3 Notifications

Notify lab supervision if results of check weight are not within acceptance criteria.

7.0 ATTACHMENTS

None

LINDSAY LIGHT II SITE

Standard Operating Procedure

Title: Operation of the Ludlum Model 2000 Alpha System

Document Number: SOP-LLII372

Revision Number: 0

Approved By:

Date: July 25, 1996

Replaces: None

OPERATION OF THE LUDLUM MODEL 2000 ALPHA SYSTEM

1.0 SCOPE

1.1 Purpose

The Ludlum Model 2000 (LM 2000) Alpha System is utilized at the control line area or in the counting laboratory for measurement of gross alpha radioactivity of various types of samples. The system normally consists of an Ludlum Model 43-10 alpha scintillation detector coupled to an Ludlum Model 2000 Scaler. This procedure describes the steps for operating the system.

1.2 Applicability

The LM 2000 system is used primarily for measuring smear samples and radon/thoron working level air samples for gross alpha radioactivity. If necessary, it may be used for the measurement of gross alpha radioactivity of air particulate and water samples in the event that the Gamma Products Model G5000 Gas Proportional Counting System is not available.

2.0 REFERENCES

- 2.1 32 Illinois Administrative Code, Parts 310 and 340, Standards for Protection Against Radiation
- 2.2 32 Illinois Administrative Code, Part 400, Notices, Instructions and Reports to Workers; Inspections
- 2.3 West Chicago Project, Health and Safety Plan for Decommissioning Activities at the Kerr-McGee Chemical Corporation Rare Earths Facility, West Chicago, Illinois
- 2.4 State of Illinois Department of Nuclear Safety Radioactive Material License Number STA-583
- 2.5 Ludlum Technical Manual for Ludlum Model 43-10 Alpha Sample Counter.
- 2.6 Ludlum Technical Manual for Scaler Model LM 2000.

3.0 DEFINITIONS

None.

4.0 REQUIREMENTS

4.1 Prerequisites

None.

4.2 Tools, Material, Equipment

4.2.1 Ludlum Model 43-10 Alpha Scintillation Detector

4.2.2 Ludlum Model LM 2000 Scaler

4.2.3 Appropriate calibration standard which is traceable to the National Institute of Standards and Technology (NIST):

- a. Eberline electroplated Pu-239 standard (serial number S-4100) or equivalent**

4.3 Precautions, Limits

4.3.1 Do not exceed 1500 volts using the H.V. ADJUST ten-turn potentiometer on the front panel of the mini scaler. Photomultiplier (PM) tube damage may result.

4.3.2 Considerable time may be lost waiting for the PM tube and crystal to dark adapt. Always keep the sample drawer in the closed position when not in use to avoid possible contamination.

4.3.3 Operate the LM 2000 only in the LINE Mode as indicated on the operating knob on the front panel. Batteries are not normally installed in the LM 2000.

4.3.4 Before counting any samples, ensure that the daily background and daily efficiency determinations have been performed.

4.3.3 Any adjustments to the high voltage, window threshold, window setting, scaler or detector change out requires a recalibration of the instrument.

4.3.4 In the event of a power failure, a background check and efficiency check is required prior to placing the instrument back in service.

4.4 Acceptance Criteria

- 4.4.1 The daily background determination passes if the number of counts lies between the ± 2 standard deviation range established by the background control chart.
- 4.4.2 The daily efficiency determination passes if the number of counts lies between the ± 2 standard deviation range established by the instrument control chart.

5.0 PROCEDURE

5.1 Initial Setup

- 5.1.1 Apply power to the instrument by turning the operating knob located on the front panel of the scaler to the LINE position.
- 5.1.2 With the sample drawer in the closed position, ensure that the high voltage is adjusted to the value determined by the most recent plateau curves. If necessary, adjust the high voltage using the H.V. ADJUST ten-turn potentiometer on the front panel of the scaler.

5.2 Plateau Curves

- 5.2.1 High voltage source and background plateau curves must be generated initially. If, for any reason, either the counting instrument, detector assembly or PM tube is changed, a set of new curves must be run.
- 5.2.2 On a VOLTAGE PLATEAU form (Attachment 2), record the instrument, observer, date, time, source serial number, and any other pertinent information.
- 5.2.3 Turn the high voltage to a minimum using the H.V. ADJUST ten-turn potentiometer on the front panel of the scaler.
- 5.2.4 Apply power to the instrument by turning the power knob located on the front panel of the scaler to the LINE position.
- 5.2.5 Set an appropriate count time (1 minute suggested) using the timer adjustment switches on the front panel of the scaler.
- 5.2.6 Place the Pu-239 check source in the sample tray and close the tray, locking

it closed with the unlocking knob.

- 5.2.7 Adjust the ten-turn potentiometer in definitive increments (50 volts suggested), recording the counts and voltage on the "VOLTAGE PLATEAU" form.

NOTE:	Do not exceed 1500 volts. If 1500 volts are exceeded the photomultiplier tube may be damaged. If using the RD-14, do not exceed 1800 volts.
--------------	---

- 5.2.8 Plot the reading versus high voltage settings on a sheet of rectangular coordinate paper.

- 5.2.9 Remove the check source from the detector and close the sample drawer.

- 5.2.10 Repeat steps 5.2.7 and 5.2.8 without the source, for a background

- 5.2.11 Plot the results of the high voltage background plateau curve on the same plot as the high voltage source plateau curve.

- 5.2.12 From the graph, choose the high voltage setting which is on the flat portion of the curve with a minimum background count. Set the high voltage to this value.

5.3 Chi-square Test

- 5.3.1 A Chi-square test must be generated upon initial setup, equipment change out or repair, high voltage adjustment, and monthly.

- 5.3.2 Obtain the "COUNTER TEST-CHI SQUARED" data sheet (Attachment 1).

- 5.3.3 Record:

- a. Your name
- b. The date
- c. Time
- d. The high voltage setting

e. The source used

- 5.3.4 Open the sample tray, place the Pu-239 source into the planchet, and close the sample tray.
- 5.3.5 Set the timer for 1 minute and depress the count button.
- 5.3.6 Upon completion of the count, record the results on the "COUNTER TEST-CHI SQUARED DATA SHEET," Attachment 1.
- 5.3.7 Repeat steps 5.3.5 to 5.3.6 until 21 data points have been recorded. Remove the source from the detector. Record this data on Attachment 1.
- 5.3.8 When all the above data has been entered on Attachment 1, perform the calculations on Attachment 1.
- 5.3.9 Using the table on Attachment 1, find the value of "P" and record the value on Attachment 1. If the value of "P" falls between 0.98 and 0.10, the counter passes the test. If the value of "P" falls outside of these values, the counter fails the test.
- 5.3.10 If the counter fails the test, rerun the test. If the counter fails a second time, tag the detector out of service and notify the lab supervisor.

5.4 Background Determination

5.4.1 Perform a 50 minute instrument background check daily.

- a. Verify that the LM 2000 is not in a count sequence by insuring that the "count" light is not lit.
- b. Open the sample tray by operating the unlocking knob and sliding the tray out of the detector.

NOTE:	The 43-10 is a scintillation detector and is light sensitive. Care must be used not to force or pull sideways when opening the sample tray.
-------	---

- c. Remove any sample that may have been left in the detector and clean the sample tray with a clean cloth.

- d. Insert the Pu-239 alpha standard and shut the sample tray by gently sliding the tray into the detector and operating the unlocking knob.
- e. Press the count button and verify that the count light is on, indicating that the LM 2000 is in a counting sequence.
- f. Counting is complete when the count light is extinguished.

5.4.2 Record the results of the background measurement onto the LM 2000 log and the daily LAB INSTRUMENT CHECK SHEET.

5.4.3 If the 2 sigma error from the daily background does not overlap the 2 sigma error of the previous 30 days background, then the sample tray should be decontaminated and the background should be recounted.

5.5 Efficiency Determination

5.5.1 Following the background measurement, perform an efficiency determination with the Pu-239 alpha standard designated for this purpose using a count time of 5 minutes. The efficiency determination must be performed daily, or if not used daily, prior to each use.

- a. Verify that the LM 2000 is not in a count sequence by insuring that the "count" light is not lit.
- b. Open the sample tray by operating the unlocking knob and sliding the tray out of the detector.

NOTE:	The 43-10 is a scintillation detector and is light sensitive. Care must be used not to force or pull sideways when opening the sample tray.
--------------	---

- c. Remove any sample that may have been left in the detector.
- d. Shut the sample tray by gently sliding the tray into the detector and operating the unlocking knob.
- e. Press the count button and verify that the count light is on, indicating that the LM 2000 is in a count sequence.

f. Counting is complete when the count light is extinguished.

5.5.2 Log the results of the efficiency determination onto the daily LAB INSTRUMENT CHECK SHEET.

5.5.3 The daily efficiency determination is acceptable if the number of counts lies between the ± 2 standard deviation range established by the instrument control chart.

5.5.4 If the instrument fails the daily efficiency determination the first time, it must subsequently pass two consecutive times before the instrument is considered acceptable for operation.

5.5.5 If the daily efficiency fails two consecutive times, the instrument is placed out of operation until the cause of the failures is investigated. The system is placed back into operation only after:

a. The cause of the failures has been identified and recorded in the instrument log.

b. Efficiencies have been verified or system recalibration has taken place.

5.6 Lower Limit of Detection (LLD) Determination

5.6.1 Use the equation shown on Attachment 3, the Smear Counting Data sheet, to determine the LLD.

5.6.2 Record the LLD on each SMEAR COUNTING DATA SHEET, or printout when available.

5.7 Routine Sample Analysis

5.7.1 Set the desired count time using the timer adjustment switches on the front panel of the mini scaler.

5.7.2 Using forceps, remove the smear or air particulate sample to be counted from the glassine envelope and load it into a sample planchet. For evaporated samples (i.e., liquids), proceed to the next step.

5.7.3 Open the sample drawer.

5.7.4 Position the sample planchet in the center of the sample drawer.

- 5.7.5 Slide the sample drawer to the fully closed position and lock closed by operating the unlocking knob.
- 5.7.6 Start the count by pressing the COUNT button on the front panel of the scaler.
- 5.7.7 At the conclusion of the count, open the sample drawer, remove the sample planchet, and return the sample drawer to the closed position.
- 5.7.8 Remove the sample from the planchet, return it to the glassine envelope, and store the sample in the designated location.
- 5.7.9 Attach the printout, if available, to the survey, recording the survey number, instrument background, efficiency, and lower limit of detection on the printout. If no printout is available, record the counts accumulated on the scaler onto the SMEAR COUNTING DATA SHEET (Attachment 3).

5.8 INSTRUMENT OUT OF CALIBRATION

- 5.8.1 When a instrument is found to be "out of calibration" or fails a daily response check immediately notify the HP Supervisor.
- 5.8.2 The HP Supervisor shall determine the last date that the instrument passed a daily source response check, or the last calibration date, whichever is later.
- 5.8.3 Based on the last acceptable source response check or good calibration date, the HP Supervisor shall determine what radiological surveys were performed with the defective instrument.
- 5.8.4 The HP Supervisor shall determine whether regulatory or general information surveys were performed with the defective instrument.
- 5.8.5 Using previous surveys or previous knowledge of the survey data, the HP Supervisor shall determine whether the surveys taken with the defective meter are acceptable or the surveys must be reperformed. In the case of regulatory surveys the survey shall be retaken, if possible, if resurveying is not possible the HP Supervisor will make a written assessment of the quality of the data.
- 5.8.6 Source check failures/ "out of calibration" are to be recorded in the instrument log book and a nonconformance report (NCR) shall be initiated per QPM-DOC #9, in order to assess trends.

6.0 RECORDS/REPORTS/NOTIFICATIONS

6.1 Lab Instrument Check Sheet

6.1.1 The LAB INSTRUMENT CHECK SHEET is utilized to record the results of the daily background measurement and daily efficiency determination. The information from the sheet is entered into the Health Physics data base.

6.2 Voltage Plateau Form

6.2.1 The VOLTAGE PLATEAU form is utilized to record the data used to generate the high voltage and background plateau curves.

6.3 Smear counting Data Sheet

6.3.1 The Smear Counting Data sheet is utilized to record all pertinent data from smear counting where no printing device is available.

7.0 ATTACHMENTS

7.1	Attachment 1	Counter Test-Chi Squared
7.2	Attachment 2	Voltage Plateau Form
7.3	Attachment 3	Smear Counting Data Sheet

Attachment 1

COUNTER TEST - CHI SQUARED (χ^2)

OBSERVER			DATE	TIME	VOLTAGE SETTING	STANDARD
COUNT TIME - ONE MINUTE						
COUNT	NET COUNT	AVERAGE				
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
TOTAL OF 20			TOTAL			

***DISCARD ONE UNUSUALLY HIGH OR LOW COUNT IN CALCULATING \bar{n} .**

$\bar{n} = \frac{\sum n}{20} = \frac{\quad}{20}$ ENTER THIS VALUE IN \bar{n} COLUMN FOR EACH COUNT NUMBER.

$\chi^2 = \frac{\sum (n - \bar{n})^2}{\bar{n}} = \frac{\quad}{\quad}$. $P = \frac{\quad}{\quad}$.

IF P FALLS BETWEEN 0.98 AND 0.10, THE COUNTER IS FUNCTIONING PROPERLY

STANDARD DEVIATION FOR A 95% CONFIDENCE LEVEL = (1.96) $\left(\frac{\sqrt{\sum (n - \bar{n})^2}}{20} \right)$.

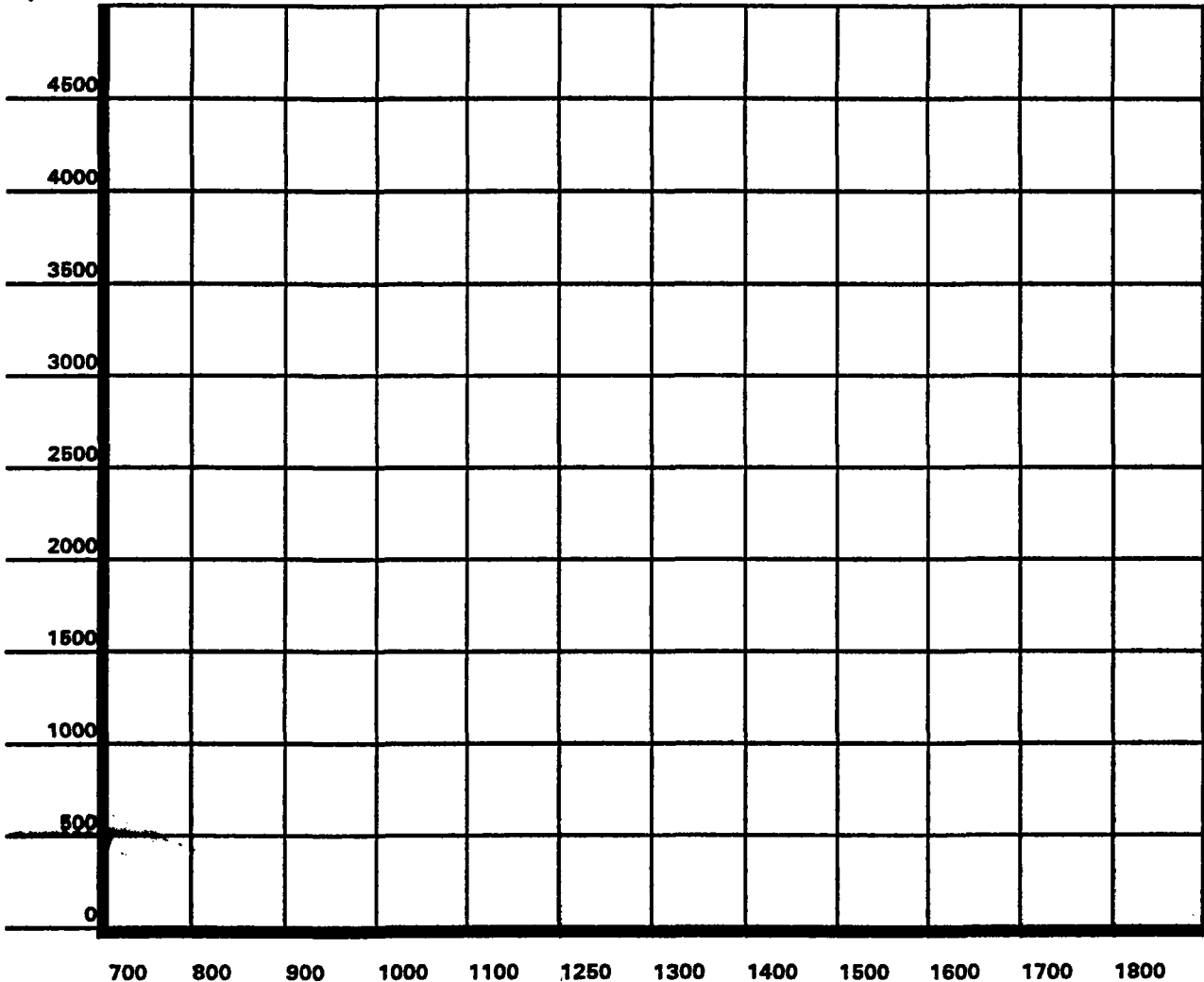
Attachment 2
VOLTAGE PLATEAU FORM
RD-14/LM-2000

Instrument Serial Number _____ Source Serial Number _____ Date _____

Pulser Serial Number _____ Scaler Model Number _____ Serial Number _____

Technician Name _____ Technician Signature _____

Counts per Minute



DETECTOR VOLTAGE

Background _____
Date _____
Survey Number _____

[illegible]

SMEAR ACTIVITY CALCULATION:

$$A = \frac{(C_g/T) - B}{EFF}$$

Where

C_c = Gross counts
T = Count time in minutes
B = Background counts per minute

EFF = **Efficiency**

LINDSAY LIGHT II SITE

Standard Operating Procedure

Title: Portable Survey Instrument Operability Checks

Document Number: SOP-LLII376

Revision Number: 0

Approved By:

Date: July 25, 1996

Replaces: None

PORTABLE SURVEY INSTRUMENT OPERABILITY CHECKS

1.0 SCOPE

1.1 Purpose

To provide a means to document the operability of portable survey instruments.

1.2 Applicability

Industry regulators and consensus groups have recently suggested changes in the way survey instruments used to define exposure rates are controlled and calibrated. Such things in the past have been routinely done under the heading of "good health physics practices" but lacked any formal documentation. Formal programs are needed to obtain this control.

2.0 REFERENCES

- 2.1 32 Illinois Administrative Code, Parts 310 and 340, Standards for Protection Against Radiation
- 2.2 32 Illinois Administrative Code, Part 400, Notices, Instructions and Reports to Workers; Inspections
- 2.3 West Chicago Project, Health and Safety Plan for Decommissioning Activities at the Kerr-McGee Chemical Corporation Rare Earths Facility, West Chicago, Illinois
- 2.4 ANSI N323-1978

3.0 DEFINITIONS

Source Check

A test of an instrument's response to a known radiation field in order to verify operability of the instrument.

4.0 REQUIREMENTS

4.1 Prerequisites

None.

4.2 Tools, Material, Equipment

4.2.1 Calibrated survey meters.

4.2.2 Necessary radioactive sources to verify operability of each type of instrument.

4.3 Precautions, Limits

Do not subject portable survey meters to physical abuse or water.

4.4 Acceptance Criteria

4.4.1 The survey instruments indicate a satisfactory response to the battery check prior to use.

4.4.2 The survey instruments indicate a satisfactory response to the check source (mean \pm 20%) prior to use.

5.0 PROCEDURE

5.1 Portable survey instruments will be source checked daily, after repair and calibration, or prior to use.

5.2 Alpha Instruments:

5.2.1 Select the desired instruments.

5.2.2 Record the current date and time on Attachment 1.

5.2.3 Check the calibration due date on each instrument to ensure that the calibration has not expired.

5.2.4 Check instrument for satisfactory physical condition. If excessive dents, torn Mylar or loose parts are found, place the instrument out of service.

- 5.2.5 Perform a battery check and record the results on Attachment 1.
- 5.2.6 Perform a source check and record the results in the appropriate columns on Attachment 1.

NOTE

The instrument must indicate within $\pm 20\%$ of the expected responses listed on Attachment 1.

NOTE

The 43-20 alpha gas probes are interchangeable with the LM-12 count ratemeters. Periodic field checks of the instrument using the source attached to the instrument are required to verify continuing operability. Should the field check indicate no response or a reduced response, return the instrument to determine if the probe requires replacement or the if instrument requires repair.

- 5.2.7 Source check each quadrant of the Ludlum Model 43-20 alpha probe and record the results in the appropriate column.
- 5.2.8 Average the four quadrant reading and record this value on Attachment 1.
- 5.2.9 Record your initials next to each instrument checked on Attachment 1.
- 5.2.10 If an instrument is missing, note on Attachment 1 why it is not in service (i.e. out of calibration, repair, not turned in, lost, etc.)

5.3 Gamma Instruments:

- 5.3.1 Select the desired instruments.
- 5.3.2 Record the current date and time on Attachment 1.
- 5.3.3 Check the calibration due date on each instrument to ensure that the calibration has not expired.
- 5.3.4 Check instrument for satisfactory physical condition. If excessive dents,

broken windows. or loose parts are found, place the instrument out of service.

5.3.5 Perform a battery check and record the results on Attachment 1.

5.3.6 Perform a response check with a Cs-137 source and record the results on Attachment 1.

NOTE

Reference readings shall be obtained on each instrument when exposed to a check source in a constant and reproducible manner at the time of, or promptly after, primary calibration.

5.3.7 Record your initials next to each instrument checked on Attachment 1.

5.4 INSTRUMENT OUT OF CALIBRATION

5.4.1 When a instrument is found to be "out of calibration" or fails a daily response check immediately notify the HP Supervisor.

5.4.2 The HP Supervisor shall determine the last date that the instrument passed a daily source response check, or the last calibration date, whichever is later.

5.4.3 Based on the last acceptable source response check or good calibration date, the HP Supervisor shall determine what radiological surveys were performed with the defective instrument.

5.4.4 The HP Supervisor shall determine whether regulatory or general information surveys were performed with the defective instrument.

5.4.5 Using previous surveys or previous knowledge of the survey data, the HP Supervisor shall determine whether the surveys taken with the defective meter are acceptable or the surveys must be reformed. In the case of regulatory surveys the survey shall be retaken, if possible, if resurveying is not possible the HP Supervisor will make a written assessment of the quality of the data.

5.4.6 Source check failures' "out of calibration" are to be recorded in the instrument log book and a nonconformance report (NCR) shall be initiated per QPM-DOC #9, in order to assess trends.

6.0 RECORDS/REPORTS/NOTIFICATIONS

- 6.1 Forward the completed Attachment 1 forms to Health Physics Supervision for review.
- 6.2 Any instruments that have failed either the battery or source checks have been removed from service.

7.0 ATTACHMENTS

- 7.1 Attachment 1 Portable Instrument Accountability Form (Example)

ATTACHMENT I

DAILY PORTABLE INSTRUMENT CHECK - WEST CHICAGO FACILITY

DATE

TIME

A M

P M ALPHA

SURVEY INSTRUMENTS

STANDARD SN

INSTRUMENT TYPE AND SERIAL NO.	SOURCE ACTIVITY	INSTRUMENT RESPONSE	SOURCE ACTIVITY	INSTRUMENT RESPONSE	BATTERY CHECK	REMARKS	INITIALS
PAC-4G w/AC-21 PROBE 1505							
3986							
3992							
4015							
4022							
4044							
4058							
4177							
4178							
6057-02							
6057-03							
6057-04							
6057-05							

DAILY PORTABLE INSTRUMENT CHECK-WEST CHICAGO FACILITY

DATE	TIME	A.M.
		P.M.

ALPHA SURVEY INSTRUMENTS				STANDARD S/N						
INSTRUMENT TYPE AND SERIAL NO.	SOURCE ACTIVITY	INSTRUMENT RESPONSE	SOURCE ACTIVITY	INSTRUMENT RESPONSE	BATTERY CHECK	REMARKS				INITIALS
PRM-6 w/AC-3 PROBE 647										
653										
736										
765										
779										
1259										
Ludlum 43-20 Alpha Detector w/LM-12 Instrument		Average Response		Average Response		Indicate quadrant and response				
Inst. Number						1	2	3	4	

DATE	TIME	AM
		PM

ALPHA SURVEY INSTRUMENTS

[illegible]

DAILY PORTABLE INSTRUMENT CHECK-WEST CHICAGO FACILITY

DATE _____

TIME	A.M.
------	------

P.M.

BETA-GAMMA INSTRUMENTS

STANDARD S/N

INSTRUMENT TYPE AND SERIAL NO.	PROBE USED	BATTERY CHECK	HIGH VOLTAGE CHECK	RESPONSE CHECK	REMARKS	INITIALS
PRM-6 648	HP-210					
1263	HP-210					
1270	HP-210					
E-530 410	HP-270					
1133	HP-270					
1180	HP-270					
PRM-7 364	NaI					
699	NaI					
704	NaI					
707	NaI					
H.P.I. 1010 345	IC					

ATTACHMENT I

DAILY PORTABLE INSTRUMENT CHECK - WEST CHICAGO FACILITY

DATE

TIME

A M

P M

BETA-GAMMA INSTRUMENTS

STANDARD SN

INSTRUMENT TYPE AND SERIAL NO.	PROBE USED	BATTERY CHECK	HIGH VOLTAGE CHECK	RESPONSE CHECK	REMARKS	INITIALS
LUDLUM MODEL 3 113990	44-40					
115345	44-40					
115385	44-40					
115025	44-40					
LUDLUM MODEL 3 114947	44-38					
115046	44-38					
115065	44-38					
115117	44-38					
115375	44-38					

LINDSAY LIGHT II PROJECT

Construction Quality Assurance Plan

Title: Construction Quality Assurance Plan

Document Number: 300

Revision Number: 0

Approved By:

Date: July 25, 1996

Replaces: None

CONSTRUCTION QUALITY ASSURANCE PLAN

Lindsay Light II Site

Chicago, Illinois

Submitted to:

U.S. EPA Region V

Office of Superfund

July 25, 1996

J. Daniel White
Kerr-McGee Offsites Project Manager

Date

David M. Jedlicka
Kerr-McGee Offsites Manager

Date

Stephen L. Wampler
Registered Illinois #062-050383

Date

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1. INTRODUCTION

This Construction Quality Assurance Plan (CQA Plan) presents the organization, objectives, and functional activities associated with construction activities for the Superfund excavation and restoration activities at the Lindsay Light II Site (Site). This CQA Plan describes the site specific-components of the quality assurance program that the Respondents, Chicago Dock and Canal Trust (CDCT) and Kerr-McGee Chemical Corporation (Kerr-McGee), will use to ensure the following:

1. Materials used in remediation are appropriate for their intended use (e.g., soil concrete, plants, etc.); and
2. Installation is to standards acceptable to the regulatory authorities (e.g., compaction, concrete placement, and landscape features).

This CQA Plan also includes Specifications associated with construction activities. These Specifications are included as Attachment A.

1.1 PROJECT OVERVIEW

The Removal Action Work Plan (Work Plan) describes the Reconnaissance Survey, Characterization Investigation Gamma Radiation Survey, and excavation and restoration at the Site. The Respondents are responsible for performing the excavation and restoration activities. Excavation and restoration comprises locating and excavating radioactive materials at the Site located in the City of Chicago. The extent of radioactive materials at the Site was identified in the Report for Characterization Investigation Gamma Radiation Survey (October 27, 1995) prepared by STS Consultants, LTD (STS Report). Kerr-McGee will supplement this information by implementing a delineation drilling program.

When the project begins, the following activities occur:

The Respondents will:

- identify and obtain necessary permits for performing excavation and restoration activities (See Appendix C of the Removal Action Work Plan (RAWP), Permitting and Access Plan) and for transportation of excavated material to Envirocare of Utah, Inc. for disposal;
- identify sources of borrow soil and topsoil that will be used for restoration, test the material to verify that it meets the project criteria for backfill, and contract for the delivery of acceptable material; and
- mobilize excavation and restoration crews and provide necessary infrastructure to support the project.

When excavation and restoration work begins at the Site, the following activities occur:

The Respondents will:

- negotiate with System Parking (property lessee) on accessing the Site to conduct excavation and restoration activities to perform all work required by the Unilateral Administrative Order (UAO);
- review the Site information, perform further delineation of the radioactive soils on the Site as necessary, and identify any site features such as pavement, shrubbery, structures, or utilities that excavation and restoration work must consider;
- prepare a Work Order identifying the work to be accomplished at the Site, including permits needed, utility relocation or protection, work on public properties or rights-of-way, excavation, and restoration;
- obtain necessary permits and permissions from public and governmental agencies and utilities as may be required;
- establish air monitoring stations at the Site;
- excavate and remove the identified radioactive soils from the Site;
- survey the Site, and verify that material exceeding the cleanup criteria has been excavated;
- if the verification survey identifies contamination exceeding the cleanup criteria, the Respondents will excavate additional material until criteria is achieved;
- contact the U.S. EPA when the verification survey is complete and request permission to backfill and begin restoration;
- backfill the excavation and complete restoration of the Site according to the Work Order;
- verify that the excavation activities have been completed; and
- prepare and submit a final report summarizing the actions taken to comply with the UAO

The following activities are accomplished to complete the project:

The Respondents will:

- prepare and submit required documentation to the U.S. EPA;
- transfer project records to the U.S. EPA; and
- demobilize the project work force.

U. S. EPA will certify that the terms of the UAO have been met.

1.2 PROJECT SCHEDULE

Excavation and restoration activities are planned to begin in the Fall of 1996 of U.S. EPA approval is received so that excavation activities are completed in early December and approval for winter shipment is received from the disposal company. If U.S. EPA approval is not made prior to a date which these activities can be completed, excavation will begin in spring 1997. An estimated schedule of excavation and restoration activities is included as Figure 1-2 in the Quality Assurance Project Plan.

2. PROJECT ORGANIZATION AND RESPONSIBILITY

The Respondents are responsible for conducting the excavation and restoration activities. The Respondents will provide construction oversight, act as the general contractor, and also act as the "contractor" for much of the work. The quality assurance and management responsibilities of key construction and quality assurance personnel are defined below, and illustrated graphically in Figure 2.1. Additional key project personnel are described in the Quality Assurance Project Plan.

The term "contractor" means Kerr-McGee or its contractors. Contractors/subcontractors used for any part of the excavation and restoration shall be competent in the work they are hired to do. Contractor/subcontractor qualifications will be kept on file.

2.1 CONSTRUCTION QUALITY

The Field Team Leader will be responsible for the quality of the construction, and ensuring that the work is conducted in accordance with the Work Plan and the UAO. He has the primary responsibility to modify site activities to meet remedial action objectives or CQA Plan procedures.

The Field Team Leader will be responsible for reviewing design criteria, plans, and Specifications for implementability and will assist in preparing the Work Order. He also has primary responsibility for documenting modifications to the Work Order or procedures accordingly.

2.2 CONSTRUCTION CONTRACTORS/SUBCONTRACTORS

Kerr-McGee intends to do much of the excavation and restoration work, using contractors and subcontractors. The construction contractors/subcontractors will perform the excavation, demolition, transport, backfill, reconstruction, and landscaping activities associated with excavation and restoration activities. Such contractors/subcontractors will meet the requirements of this CQA Plan, including the requirements of the Specifications.

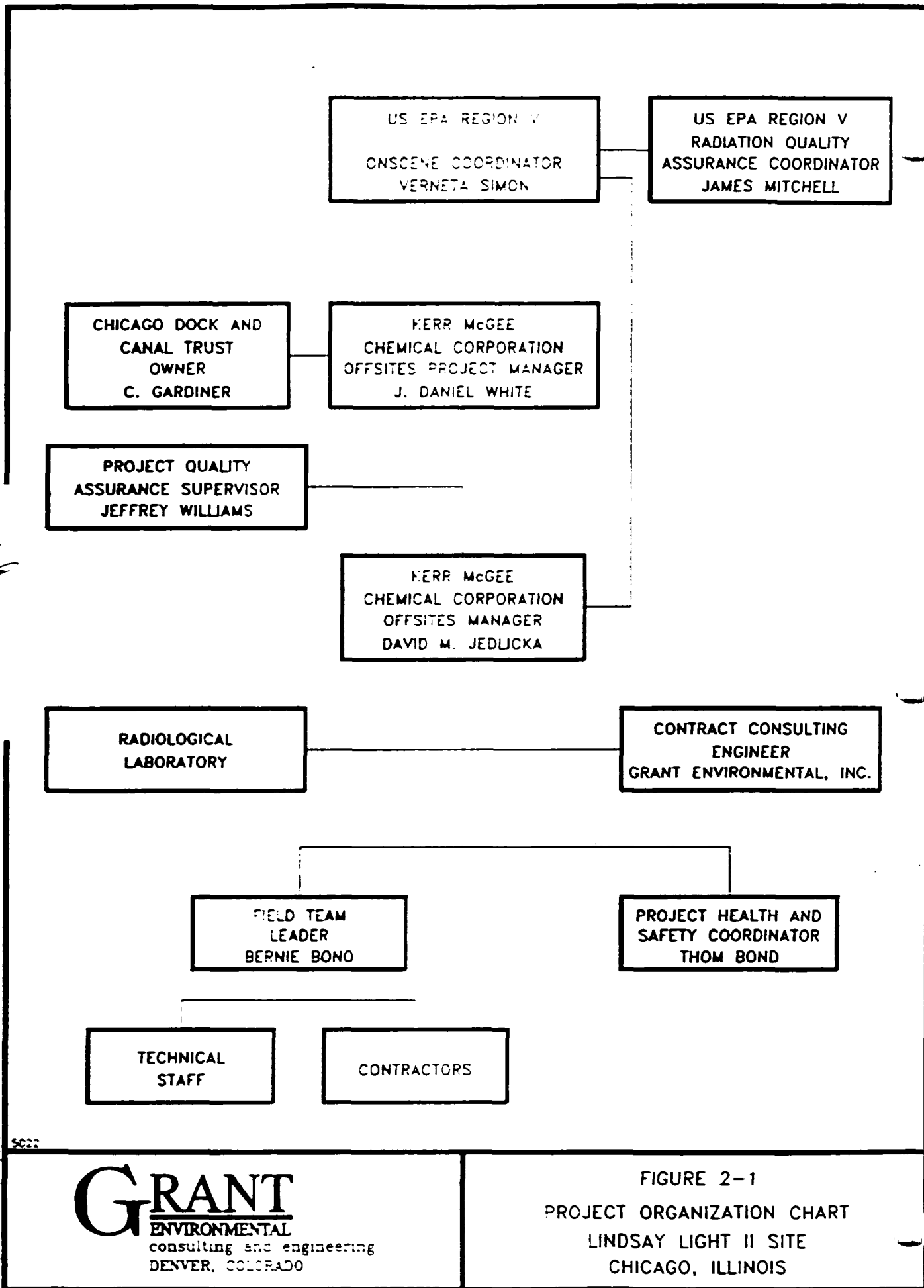
2.3 QUALITY ASSURANCE SUPERVISOR

The Project Quality Assurance Supervisor is responsible for implementing Kerr-McGee's Corporate Quality Assurance Program, the Lindsay Light II Site Quality Assurance Project Plan, and this CQA Plan. The Project Quality Assurance Supervisor is independent of the line organization directly responsible for accomplishing the excavation. He reports to the Offsites Project Manager, and has access to Kerr-McGee's Corporate Quality Assurance Officer in matters relating to compliance with these programs.

The Project Quality Assurance Supervisor is responsible for verifying compliance with this CQA Plan, reviewing construction quality assurance documentation, and tracking deviations from the CQA Plan.

The Project Quality Assurance Supervisor will review and evaluate all construction activities to determine compliance with the Specifications for the excavation work. He is independent of the management structure directly responsible for the construction work.

A. Jensen



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DENVER, COLORADO

FIGURE 2-1
PROJECT ORGANIZATION CHART
LINDSAY LIGHT II SITE
CHICAGO, ILLINOIS

3. INSPECTION AND TESTING ACTIVITIES

To properly complete the excavation and restoration activities, all work and materials will be tested and inspected to ensure compliance with the Specifications. Testing and inspection are interrelated but separate quality control activities. The quality assurance aspects of these two activities are described below.

3.1 INSPECTIONS

Inspections of the work will be done by several persons (e.g., the workers, the crew foreman) but the Field Team Leader will have the primary responsibility for inspection, (Reference: Section 01030) and the responsibility for documenting that work was done to the requirements of the Specifications and the UAO.

Inspectors will be experienced in the work described in the Specifications (see Attachment A).

Inspections will be made at critical points in the excavation and restoration sequence, and generally will be made about once each day. Critical sequence points include, but are not limited to, the following:

- After construction staking (site preparation) has been completed but before excavation, backfilling, or other construction, begins;
- During general excavation and backfilling, to observe the methods and procedures used for such work;
- During the installation of shoring and bracing and approximately one day after their installation if they are to remain in place for several days;
- During the Verification Sampling to determine that the Site excavations meet the cleanup criteria;
- At times when materials inspections are being done by testing personnel, e.g., during tests of the compaction of backfill materials or during pressure tests of replaced utility lines; and
- During restoration of work order items.

The Field Team Leader will immediately inform construction personnel any time it is believed that the requirements of the Specification are not being met, and to halt construction activities if exceptions are not corrected in a timely manner. Some exceptions may be the result of unexpected conditions or work. In these cases, the Field Team Leader will:

- assist the Contractor/subcontractor or construction personnel in determining a solution which fulfills the intent of the Specifications and the UAO; and,
- document the exception and the resolution.

Observations made by an inspector will be recorded in field logbooks. Standard procedures for setting up a Field Logbook and for recording field observations are provided in SOP-215. The field logbooks will become a part of the permanent files for the Site. A summary of the observations will be prepared each day and recorded in the field logbook. This summary will include such things as submittals received, status of the work completion at the Site, and status of the scheduled work inspections. Any exceptions to the Specifications without an approved work change authorization or interim change notice, shall be documented as a nonconformance.

3.2 TESTING

Sampling and testing that will be conducted to qualify backfill soils are described in the Field Sampling Plan, which is an attachment to the Quality Assurance Project Plan. Inspections and tests that will be made to verify that the soil is placed according to the Work Order and the project requirements are described in the Specifications (Attachment A) for the various work items.

The Field Sampling Plan and the Specifications require testing of both materials and work done for the excavation and restoration activities at the Site. The Specifications describe the various tests and testing frequencies, and require that all testing be documented. Forms to document testing or observations unique to this project are included in the Specifications. Results from standard testing, such as density testing, will be reported on forms that comply with the appropriate standard test protocol (for example, ASTM test methods).

The Field Team Leader will schedule the testing and ensure all testing is properly documented.

4. REPORTING

The Field Team Leader will prepare and sign documentation verifying that required inspections and tests have been completed, and the work inspected and tested meets the requirements established in the Work Order and Specifications. Other records, such as daily summary reports and field log books prepared by the Field Team Leader, may be required to provide a complete record of the compliance. Such records are considered a part of the quality assurance documentation for the work.

4.1 DAILY RECORDKEEPING

Daily recordkeeping includes preparation and completion of field log books, daily summary reports, corrective action requests, and nonconformity reports. Daily record keeping requirements are discussed in the following section.

4.1.1 Daily Summary

The daily summary will be completed either in the field logbook during excavation by the Field Team Leader in accordance with SOP-LLII 215, or on a daily summary reports, during restoration, by the Field Team Leader.

4.1.2 Nonconformance and Corrective/Preventive Action

4.1.2.1 Control of Nonconforming Product/Services

Adherence to the requirements of this section will ensure that critical materials, products, services, or other items which do not conform to specified requirements are not inadvertently used, installed, or shipped. The Respondents will use these Kerr-McGee procedures for controlling nonconforming products. Nonconforming critical items are clearly identified and segregated to await evaluation and final disposition.

Each nonconformance is documented, identified, and described, with a recommendation for disposition. Reworked, repaired, and replacement items are inspected and tested against original inspection and test requirements. Rejected or scrapped materials are disposed of effectively and efficiently. Final disposition is approved and closed out by the Offsites Project Manager, or designee.

4.1.2.2 Corrective and Preventive Action

The quality assurance system employs corrective and preventive action to correct and eliminate root causes of problems which are systemic and/or repetitive, or which could occur at a future time. The Respondents will use the Kerr-McGee quality assurance system for corrective and preventive action.

4.1.2.2.1 Corrective Action

Corrective action is necessary to remedy nonconformities. Nonconformities can be reported by the Customer, by any supplier, or by a contractor and are reported on Nonconformity Report Forms (Figure 4.1). Nonconformities discovered during internal or client audits are reported as Corrective Action Requests (Figure 4.2). Corrective action includes:

- Identification of observed nonconformances in supplied product, services, operations, or output product.
- Investigation of the discrepancy.
- Determination of the cause.
- Initiation of actions to correct the nonconformance to a degree appropriate to the magnitude of problems and commensurate with the risks encountered,
- Evaluation of the effectiveness of the corrective action in preventing recurrence, and
- Changing the system and system documentation when necessary.

Responsibility for corrective action is determined organizationally by the area affected. The Offsites Project Manager, or designee, approves closure of all corrective and preventive actions.

4.1.2.2.2 Preventive Action

Where corrective action is necessary to eliminate a nonconformance or correct a deficiency, preventive action is taken to discover and eliminate potential nonconformance. Preventive action includes:

- Periodically reviewing work operations, audit results, quality records, service reports, and customer complaints to detect and eliminate potential causes of nonconformities;
- Discovery and evaluation of alternative solutions to prevent nonconformance to a level corresponding to the risks encountered;
- Implementation of an appropriate solution alternative;
- Evaluation of the effectiveness of the preventive action to prevent recurrence;
- Changing the system and system documentation when necessary;
- Assuring that Management reviews all preventive actions; and

- Establishing procedures to assure that the preventive action process occurs continually.

Responsibility for preventive action is the same as for corrective action discussed above.

4.2 PHOTOGRAPHIC RECORDS

Photographs of work in progress, problems, and corrective measures will be part of the photographic reporting. Photographs and videotapes of remediated areas will be kept as permanent files and organized in the order in which they can be easily retrieved. Information pertinent to the photograph will be recorded on the back of the photograph and may include the following information:

- the date, time, and location where the photograph was taken and weather conditions;
- the size, scale, and orientation of the subject matter photographed;
- location and description of the work; and
- the purpose of the photograph.

4.3 DOCUMENT STORAGE

Quality records will be indexed, filed, and stored in accordance with the Project Filing System Procedure (SOP-LLII 101).

4.4 REFERENCES

Kerr-McGee Quality Assurance Manual

Kerr-McGee Quality Procedure Manual

FIGURE 4.1
NONCONFORMITY REPORT

(Instructions on Back)

DATE: _____	REPORT NO: _____
VENDOR/DEPT: _____	ORIGINATOR: _____

DESCRIPTION OF NONCONFORMANCE
SIGNATURE: _____
DATE: _____

DISPOSITION
USE AS IS: ____ REWORK: ____ REGRADE: ____ REJECT: ____ SCRAP: ____
ACTION TAKEN: _____
EXAMPLE
ACTION TAKEN BY: _____
DATE ACTION TAKEN: _____

CLOSE-OUT
REMARKS:
RESPONSIBLE AREA MANAGER: _____
DATE CLOSED: _____
QA SUPERVISOR: _____
DATE CLOSED: _____

FIGURE 4.1
NONCONFORMITY REPORT
(continued)

The following instructions are printed on the back of the **NONCONFORMITY REPORT** form:

1. **ORIGINATOR** is the person who discovers the nonconformity.
2. **ORIGINATOR** fills out **DATE** and, if possible, obtains **REPORT NO** from QA Supervisor and fills in on form.
3. **ORIGINATOR** fills in **DESCRIPTION OF NONCONFORMANCE**, signs (**SIGNATURE**), dates (**DATE**), sends form to Responsible Area Manager, and informs the QA Supervisor of the nonconformity.
4. Responsible Area Manager checks form for **REPORT NO**. If no **REPORT NO**, he/she obtains one from the QA Supervisor and puts on the form.
5. Responsible Area Manager fills in the **DISPOSITION** section of the form by specifying **ACTION TAKEN**, signing off on action taken (**ACTION TAKEN BY**), and dating (**DATE ACTION TAKEN**) the form. The written description of action taken should include remedial action taken as well as action taken to permanently solve the problem.
6. Responsible Area Manager closes out the nonconformance by making any **REMARKS**, signing (**RESPONSIBLE AREA MANAGER**), dating (**DATE CLOSED**), and forwarding the form to the QA Supervisor.
7. QA Supervisor acknowledges close-out by signature (**QA SUPERVISOR**) and date (**DATE CLOSED**) and files the form.

FIGURE 4.2
CORRECTIVE ACTION REQUEST

(Instructions on Back)

DATE: _____	AUDIT: YES ____ NO ____	REQUEST NO: _____
VENDOR/DEPT: _____		ORIGINATOR: _____

NONCONFORMING CONDITION:

ASSIGNEE: _____ BY PROJECT MANAGER	DATE ASSIGNED: _____
---------------------------------------	----------------------

ROOT CAUSE:

ACTION TAKEN: <div style="text-align: center; margin-top: 100px;">EXAMPLE</div>	
PROMISED COMPLETION DATE: _____	COMPLETION DATE: _____
ASSIGNEE: _____	

VERIFICATION (EFFECTIVENESS OF ACTION TAKEN):	
VERIFIED BY QA: _____	DATE VERIFIED: _____

CLOSEOUT BY: _____ PROJECT MANAGER	DATE CLOSED: _____
---------------------------------------	--------------------

FIGURE 4.2
CORRECTIVE ACTION REQUEST
(continued)

The following instructions are printed on the back of the **CORRECTIVE/PREVENTIVE ACTION REQUEST** form:

1. **ORIGINATOR** is the person initiating the **CORRECTIVE/PREVENTIVE ACTION REQUEST (CAR)**.
2. **ORIGINATOR** fills in **DATE**, indicates if the CAR is the result of an **AUDIT (YES or NO)**, identifies **VENDOR/DEPT**, signs or prints as **ORIGINATOR**, and sends form to Project Manager.
3. Project Manager obtains **REQUEST NO** from the QA Supervisor and fills in the form.
4. Project Manager assigns the CAR to an **ASSIGNEE**, fills in his/her name, and the **DATE ASSIGNED**.
5. Project Manager forwards form to **ASSIGNEE** and sends a copy to QA Supervisor.
6. **ASSIGNEE** investigates **ROOT CAUSE** and states finding on the form.
7. **ASSIGNEE** lists on the form any remedial **ACTION TAKEN** to immediately solve the problem and the date such action was taken. He/she determines any permanent **ACTION** to be **TAKEN** and documents along with **PROMISED COMPLETION DATE**. The **ASSIGNEE** takes action or works with the Project Manager to see that action is taken.
8. **ASSIGNEE** signs form after action is taken and lists the **COMPLETION DATE**.
9. **ASSIGNEE** sends form to QA Manager.
10. QA Manager verifies and reports on **EFFECTIVENESS OF ACTION TAKEN**, signs (**VERIFIED BY QA**), and dates (**DATE VERIFIED**) form and sends to Project Manager for closeout.
11. Project Manager signs (**CLOSEOUT BY**) and dates (**DATE CLOSED**) to signify closeout and sends form to QA Supervisor for filing.

ATTACHMENT A SPECIFICATIONS

LINDSAY LIGHT II PROJECT
Construction Quality Assurance Plan
Attachment A

Title: Specifications

Document Number: 301

Revision Number: 0

Approved By:

Date: July 25, 1996

Replaces: None

List of Specifications

Section 01010	Summary of Work
Section 01020	Construction Health and Safety
Section 01030	Special Project Procedures
Section 01060	Compliance with Codes and Standards
Section 01340	Submittals
Section 01500	Temporary Facilities and Controls
Section 01560	Environmental Protection
Section 02010	Demolition and Debris Removal
Section 02200	Contaminated Material Loadout and Earthwork
Section 02220	Undermining Existing Features
Section 02840	Site Utilities
Section 03300	Cast-In-Place Concrete

Section 01010 Summary of Work

Part 1 - General

1.1 Description of the Project

This project directed by the United States Environmental Protection Agency Region V (U.S. EPA) is at a location designated by the U.S. EPA as the Lindsay Light II Site (Site) in Chicago, Illinois. The work covered by these specifications includes the following.

A. Site Description

Radioactive materials in concentrations above background have been found on the Site within the City of Chicago. The presumptive source of these materials is the Lindsay Light Company in Chicago. The identified "Site" is designated as a parking lot operated by System Parking, and owned by the Chicago Dock and Canal Trust (CDCT). Kerr-McGee Chemical Corporation is a successor of the Lindsay Light Company.

The Site is defined, for the purposes of the excavation and restoration action and according to the UAO, as the area with soil 5 picocuries per gram (pCi/g) total radium above background bounded by East Grand Avenue on the north, East Illinois Street on the south, McClurg Court on the east, and Columbus Drive on the west in downtown Chicago, Illinois. Final definition of the limits of soil excavation and restoration will be the responsibility of the Respondents and their consultants and contractors.

B. Project Description

1. Work for the cleanup of the Site will be excavation and removal of impacted soil and restoration of the property.
2. Site preparation includes all of the work which must be done before any excavation and restoration can begin. Some of the work, such as determining background air quality and background radiation, will be common to the entire Site. Other work, such as verifying the extent of contamination and documenting existing physical conditions, will be area-specific.
 - a. Access Agreements. Discussions with the property owner and tenant concerning access will begin promptly upon notice from the U.S. EPA. Once the initial access agreement is signed, the work described below will begin. Every effort will be made to keep the property owner and the

U.S. EPA informed of any changes to the work and to the schedule. Descriptions of the management plan for obtaining access agreements are included in Appendix C of the Remedial Action Work Plan (Work Plan).

- b. Permits. Under Superfund, Kerr-McGee is exempt from obtaining permits from the City of Chicago and Cook County for the excavation and restoration work conducted on-site, but must obtain permits for portions of the work accomplished off-site. Some permits, particularly those issued by the Department of Transportation to commercial carriers to transport the excavated soils and debris over public streets, will not be sought by Kerr-McGee and, therefore, are not addressed in this Plan. Kerr-McGee will contract only with transportation companies qualified and licensed to carry such materials. A list of the expected permits is included in Appendix C of the Work Plan, Permitting and Access Plan.
- c. Background Air Monitoring. Monitoring and analyses, completed using the Kerr-McGee Rare Earths Facility (REF) background air monitoring station #17, located 2 miles north of the REF, will provide adequate data to determine a background air quality which can be used for the Site. A description of the air monitoring that will be done is included in the Quality Assurance Project Plan (QAPP) for the Site.
- d. Site Survey. Prior to work which could disturb any of the landscaping, facilities, utilities or structures on the property, the property will be physically surveyed to document the location and condition of all of the foregoing and to provide guidance as to the horizontal and vertical limits of contaminated soils and excavation and backfill. Surveying requirements are described in Section 02200 of these Specifications and in the Work Plan.
- e. Soil Sampling. Soil sampling is described in the Field Sampling Plan.
- f. Utilities. For the Site, "utilities" will include, but not be limited to, natural gas, drinking water, waste water, communications, electrical power distribution, and storm water collection systems. The locations of all utilities will be determined, field located and shown on all maps and drawings for the properties. All work to replace, repair or backfill utilities shall be done as required by the appropriate utility company or agency. The work for locating, replacing, repairing and backfilling utilities is included in Section 02840 of these Specifications and in Section 4.1.1.4 of the Work Plan.
- g. Buildings. Prior to beginning removal work, any buildings or structures within the identified areas of contamination (see Sections 02010 and 02200 of these Specifications) will be physically and radiologically

surveyed to document their physical and radiological conditions, and drawings showing the location of the building or structure and any contaminated portions thereof will be prepared. If necessary, provisions shall be made for cleaning or demolition of the building or structure. If demolition is necessary, the extent will be discussed with the Property Owner, and provisions for compensation or reconstruction agreed to.

3. Excavation and restoration work includes removing any structures, facilities, landscaping or other appurtenances as necessary, excavating contaminated soils, cleaning contaminated buildings, facilities, structures, utilities and appurtenances, verifying that radioactivity greater than the cleanup criteria has been removed, backfilling all excavations, and replacing all disturbed paved surfaces, landscaping, structures, facilities, utilities and appurtenances.
 - a. Work to remove asphalt paving, sidewalks, foundations, retaining walls, etc., is described in Section 02010 of these Specifications.
 - b. Work to excavate contaminated soils is described in Section 02200 of these Specifications and in the Health and Safety Plan (HASP) for the Site.
 - c. The requirements for soil sampling are described in the Field Sampling Plan.
 - d. The work for properly backfilling all excavations is included in the Work Plan.
 - e. Restoration work is described in the following sections:
 - (i) Utilities - Section 02840 of these Specifications.
 - (ii) Structures (concrete drives, walkways, etc.) - Section 03300 of these Specifications.

1.2 Related Work

Other Division 1 Sections of these Specifications.

1.3 Definitions

- A. Access Agreement refers to a legal document between the Contractor, Property Owner and tenant authorizing the Contractor or the U.S. EPA to complete the excavation and restoration action as described in these Specifications, the Work Plan, the HASP, the FSP, and the QAPP.
- B. City refers to the City of Chicago and its representatives.

- C. Contract Documents for the work consist of the drawings, these specifications and all addenda issued prior to and all modifications issued after the execution of the contract.
- D. Contractor refers to Kerr-McGee and its subcontractors and consultants.
- E. County refers to Cook County, Illinois and its authorized representatives.
- F. U.S. EPA refers to the Region V office of the United States Environmental Protection Agency and its representatives.
- G. Job Set refers to a complete set of Project Record Documents used during construction activities.
- H. Project refers to all activities associated with the excavation and restoration action.
- I. Tenant refers to System Parking, the present renter of the site.
- J. Property Owner refers to the owner of the Site which is Chicago Dock and Canal Trust (CDCT).
- K. REF refers to the Kerr-McGee Rare Earths Facility, in West Chicago, Illinois.
- L. Respondents refer to the Kerr-McGee Chemical Corporation (Kerr-McGee) and Chicago Dock Canal and Trust (CDCT).
- M. State refers to the State of Illinois and its authorized representatives.
- N. Utilities. For the project, "utilities" will include, but not be limited to, natural gas, drinking water, waste water, communications, and electrical power distribution and storm water collection systems.
- O. Work Order refers to the plans, drawings, additional specifications, directions and agreements prepared for properly completing work at the Site.

Part 2 - Products

Not used.

Part 3 - Execution

3.1 Scope of Work

- A. The work to be performed includes furnishing all labor, tools, equipment, materials, transportation, services, and incidentals, and performing all operations necessary for the construction as shown and noted on the drawings

and as required in these Specifications.

- B. The work includes the decontamination and reconstruction of the Site and the management of excavation and demolition materials in accordance with the Statement of Work. The work included is further described in Article 3.2, Construction Sequence.

3.2 Construction Sequence

Except as specifically noted, the construction sequence described below is intended as guidance for this project. At the discretion of the Contractor, the work may be done simultaneously or in an order other than below, as long as it will not affect the quality, timely completion, or safety of the work.

A. Site Preparation

1. Obtain access agreements.
2. Delineation drilling program.
3. Obtain permits, if required.
4. Mobilize laboratory trailer.
5. Do site surveys.
6. Secure Site for excavation activities. Install temporary access control fencing to restrict access to work areas. Fencing will be placed and moved as needed to minimize any disruption to the Site and to the work.
7. Prepare Work Order.

B. Mobilization

1. Mobilize personnel, equipment, materials, and temporary facilities needed for the project. Provide for electrical, water, communications and other utilities as required for the work.
2. Provide site-specific training for workers. Discuss work with crews, including areas of special concern (construction and radiological), construction schedule and sequence, and health and safety.
3. Set up temporary runoff controls.
4. Prepare the personnel and equipment decontamination facilities.
5. Select areas within the Site for staging soils, containers and demolition

materials. Prepare areas as necessary (e.g., berms for temporary water control, or plastic sheeting if on "clean" area)

6. Set up the air monitoring system and begin monitoring.
7. Set up traffic controls, as required.

C. Contamination Excavation

1. Excavation and restoration of contaminated buildings is not anticipated. However, should contamination excavation and restoration of buildings be required, special instructions and Specifications will be included in the Work Order. This will include issues related to contamination excavation and restoration and demolition of buildings, such as work with asbestos-containing materials.
2. Excavation of contaminated soil will occur using these steps:
 - a. Do construction staking or marking (additional surveying, as necessary, for horizontal and vertical limits of soil excavation).
 - b. As necessary, lock-out, tag-out, and/or shut down all utilities which could affect or be affected by the work. Purge, decontaminate and otherwise properly manage utilities so they can be removed, protected from damage, or relocated, as necessary.
 - c. Excavate the contaminated soils on the property and transport them to the disposal facility. Stockpile soils on the Site only as necessary.
 - d. Do soil sampling and gamma surveying to determine if additional excavation is necessary.
 - (i) If necessary, do construction staking. Continue excavating until surveying and sampling indicate all contaminated materials have been removed.
 - (ii) Notify the U.S. EPA that verification sampling has been completed and request approval to backfill.
 - e. Upon U.S. EPA approval begin restoration activities.

D. Restoration

1. Survey decontamination stations, stockpile areas, excavation equipment and tools, and other facilities and structures used to excavate, store and transport contaminated materials. Decontaminate, or prepare for transport, all as necessary. Remove decontaminated equipment from the Site unless

necessary for property restoration work.

2. Backfill excavations with suitable soils and regrade the property to the contours shown on the Work Order drawings.
3. Pave lot with asphalt, replace curbs and sidewalks, restore utilities, replace guardrails and signs.
4. Restore the property as agreed to in the Work Order, and as described in these Specifications.

3.3 Disruption

- A. The contractor will, to the extent practical, use his best efforts to undertake the project in a manner that avoids unnecessary disruption of local businesses and their customers or tenants.
- B. Refer to Section 01500 of these Specifications for relocation requirements.

3.4 Work Quality Control

- A. Shop and field work shall be performed by personnel thoroughly trained and experienced in their field of expertise. Work on this project shall be performed in accordance with the best practices of the various trades involved.
- B. Quality control inspections will be conducted for all construction activities under these specifications. The inspector will be independent of the work activity being inspected.
- C. Work will be certified as having been completed in full satisfaction of these Specifications.
- D. ~~Work~~ will be done as required by these Specifications, the Quality Assurance Project Plan, and other documents referenced in these Specifications.

END OF SECTION 01010

Section 01020 Construction Health and Safety

Part 1 - General

1.1 Scope

A formal Health and Safety Plan (HASP) has been prepared for the work described in these Specifications. This section of the Specifications summarizes the requirements of the HASP as they apply to the construction work, and references those sections of the HASP where detailed descriptions of the health and safety requirements and procedures can be found.

1.2 Related Work

- A. Division 1 Section of these Specifications.
- B. Section 02010 - Demolition, Debris Excavation, and Property Disposition
- C. Section 02200 - Earthwork
- D. Section 02840 - Site Utilities

Part 2 - Products

Not used.

Part 3 - Execution

3.1. Safeguards will be taken to ensure the safety of workers in and around excavations. These will include, but not be limited to, the following:

- a. Stairways, ladders, ramps, or other safe means of egress will be located in trench excavations that are 4 feet or more in depth.
- b. No persons will be permitted underneath loads handled by lifting or digging equipment. Personnel are required to stand away from any vehicles being loaded or unloaded to avoid being struck by any spillage or falling materials.
- c. All trenches and excavations 6 inches or deeper will be marked and guarded for the duration of the project with barricades placed a minimum of 2 feet from the edge of the excavation to prevent persons from falling into the opening.
- d. Emergency rescue equipment such as breathing apparatus, a safety

harness and line, etc., will be readily available where hazardous atmospheric conditions exist or may be reasonably expected to develop during work in excavations.

- e. Precautions will be taken to prevent surface or runoff water from entering the excavation. Ditches, dikes, or other effective means will be installed or used to prevent water from entering the excavation and to drain the surrounding areas.
- f. Any excavation that meets the definition of a confined space will be treated as such, as defined by OSHA 1910.146, and all applicable procedures detailed in Section 13 of the HASP will be followed. A crawl space or storm cellar area could fall within the definition of a confined space if it: (1) is large enough and so configured that personnel can bodily enter and perform assigned work; and (2) has limited or restricted means for entry or exit; and (3) is not designed for continuous personnel occupancy.
- g. All personnel in an excavation greater than four feet in depth will be protected from cave-ins by an adequate protective system. An adequate protective system will include barrier protection (e.g., shoring or trench boxes) or sloping. Other protective measures required by 29 CFR 1926, Subpart P also will be provided.
- h. The determination of the angle of repose and design of any supporting system will be based on careful evaluation of pertinent factors such as depth of cut; possible variation in water content of material while the excavation is open; anticipated changes in materials from exposure to air, sun, water, or freezing; loading imposed by structures, equipment, overlying material, or stored material; and vibration from equipment, blasting, traffic, or other sources.
- i. Daily inspections of excavations, the adjacent areas, and protective systems will be made and documented by a competent person. The documentation will include indications of potential cave-ins, failure of protective systems, hazardous atmospheres, or other conditions.
- j. No employee or any other person will work adjacent to or enter an excavation until the work area has been inspected by the competent person. The inspection will determine if conditions exist which may expose workers to moving ground or any other unsafe conditions. Any deficiencies identified during inspections will be adequately corrected prior to work in excavation.

3.2. Training

1. All persons active in the excavation work at the Site will receive training as specified in Section 5 of the HASP for work with low-level radioactive materials. The training program in Section 5 of the HASP is in accordance with 29 CFR 1910.
2. In addition to the training above, periodic "tailgate" health and safety meetings will be held. The purpose of these meetings will be to discuss deficiencies in health and safety practices, discuss hazards specific to new properties or encountered at existing properties, discuss the results of monitoring, and generally reinforce good health and safety practices. A typical form for such meetings is found in Section 5 of the HASP.
3. Special training shall be provided or required for work such as the following.
 - a. Supervisory Work. All supervisors shall have received at least the additional eight hours training required by OSHA.
 - b. Truck Driver. All truck drivers shall be instructed in and knowledgeable about the routes to be used between the property and the train station, the requirements of the work (work with and transport of potentially radioactive materials), and the emergency and contingency procedures to be implemented in the event of an accident.
 - c. All persons employed in the transport and handling of radioactive materials shall have received HAZMAT training.

3.3. Personal Protective Equipment (PPE) - Based on information obtained by Kerr-McGee from monitoring observation of similar work at West Chicago, work at this Site can be done in Level D PPE. The Health and Safety Coordinator will ~~evaluate~~ individual tasks and work areas and specify particular types of PPE based on this evaluation. PPE utilized in the performance of the work under these specifications will be in accordance with Sections 7 and 8 of the HASP.

3.4 Hot Work

A.. Flame welding and cutting operations

1. Gas bottles shall be properly color-coded, in good condition, and stored in a secured manner in racks or carts. Bottles with corroded or damaged threads will not be used.
2. Regulators shall be in good condition, and suitable for the use.
3. Fuel gas and oxygen hose shall be easily distinguishable and shall not be interchangeable. Hoses shall be inspected at the beginning of each shift

and shall be repaired or replaced if defective.

3.5 Transporting Contaminated Materials Over Uncontaminated Areas

A. Transport between the Site and the Rail Terminal

1. Haul routes between the Site and the rail terminal will be defined (see Traffic Control Plans in Appendix D of the Work Plan), and all operators will be instructed in the location and use of these routes. Transport of contaminated materials will be over designated routes only.
2. Rolloff containers used to transport contaminated materials over uncontaminated areas will be capable of transporting the material without spillage. Covers will be secured onto the containers prior to exiting the contaminated area. Empty trucks returning to the site will be tarped, as will trucks supplying clean backfill, topsoil, and related construction materials. Tarps will be fastened down tightly to prevent material from being blown out of the trucks.
3. Trucks and rolloff containers used to transport contaminated materials will be frisked and decontaminated if necessary in accordance with Subpart 3.8, below, prior to exiting the contaminated area.
4. Should a truck hauling contaminated material from the Site to the rail terminal accidentally spill any part of its load, the Contractor will direct site workers to assist in the cleanup. Spill cleanup, including proper notification of agencies and authorities, will be accomplished in accordance with the Emergency Contingency Plan.

B. Transport within a Property

1. Haulage routes will be established within the Site and all workers will be instructed in the location and use of these routes. Following excavation and restoration of soils and other materials, such routes will be examined, visually and with radiation detection equipment, for the presence of spilled materials. All spilled materials will be removed.
2. Practices to control spillage will be implemented during excavation and restoration. These practices will include such things as the following:
 - a. Not filling haul equipment above the sides of the bed or bucket,
 - b. Limiting travel speed, and
 - c. Covering haul routes with clean soil or other materials. Such materials would be inspected as above, and decontaminated for reuse or properly transported to the rail terminal for eventual transfer to the approved

disposal facility.

3.6 Equipment Decontamination Facilities

- A. Equipment Decontamination Station - An equipment decontamination station will be readily available for the decontamination of vehicles, tools, and equipment, prior to exiting the controlled area. The equipment decontamination station will be located within the secured area, and will include the following:
1. A steam pressure washer for removing contamination from the wheels, tracks, and other surfaces of the equipment and trucks.
 2. An impermeable catchment area for collecting and temporarily storing wash water.
 3. A method for removing, and transporting and disposing, if necessary, any wash water.
- B. Release of Construction Vehicles and Equipment for Unrestricted Use - Prior to being released from the Exclusion Zone, all construction vehicles and equipment will be frisked, and decontaminated if necessary. Contaminated vehicles and equipment will be decontaminated using a pressurized water spray in accordance with Subpart A, above. Water generated during the decontamination activities will be evaporated, used for dust control, or collected and stored on the Site for other purposes or eventual disposal.

3.7 Dust and Water Runoff Control

- A. Dust control measures used during work activities on the Site may include, but are not limited to the following:
1. ~~Using~~ hoses with mist or fog nozzles to spray light applications of water over the areas of excavation or demolition, staging, loadout, and dumping/storage. The Contractor will be responsible for the control of excess water.
 2. Minimizing travel over soil areas. Some travel over contaminated soils (e.g., by excavation equipment and by haul trucks) may be necessary. Dust minimization procedures will include, but not be limited to, the following.
 - a. Within the property, the speed limit for trucks and excavation equipment will be fifteen miles per hour.
 - b. Areas which will be used extensively as travelways (e.g., entrances to and exits from equipment decontamination facilities) will be sprayed with water as necessary to control dust.

3. Storage and staging piles will be covered when not in use.
- B. Runoff water control measures on the Site may include, but are not limited to, the following:
1. Excavation of temporary swales, ditches, and/or retention ponds.
 2. Construction of temporary diversion dikes and berms.
 3. Pumping of water to runoff water control facilities. Water removed from contaminated excavations will be evaporated, used for dust control, or collected and stored on the Site.

3.8 Contingency Plans and Emergency Response Procedures

Contingency plans and emergency response procedures for Site activities are provided in the Emergency and Contingency Plan. These plans and procedures will be followed in the event of an emergency situation arising from the work activities or acts of God that may affect the environment or human health and safety.

END OF SECTION 01020

Section 01030 Special Project Procedures

Part 1 - General

1.1 Scope

This section describes the following project requirements and procedures:

- A. Inspections
- B. Daily Reports
- C. Monthly Reports
- D. Verification Notice
- E. Construction Completion Report

1.2 Related Work

- A. Division 1 Sections of these Specifications.
- B. Section 01340 of these Specifications.

1.3 Submittals

- A. Comply with pertinent provisions of Section 01340 of these Specifications.
- B. Submit the daily reports as required by Article 3.1 of this section of the Specifications.
- C. ~~Submit~~ Submit the Monthly Progress Reports as required by Article 3.2 of this section of the Specifications.
- D. Submit the Verification Notice as required by Article 3.3 of this section of the Specifications.
- E. Submit the Construction Completion Report as required by Article 3.4 of this section of the Specifications.

Part 2 - Products

Not used.

Part 3 - Execution

3.1 Inspections

- A. Construction Inspections during all construction activities will be conducted by the Contractor or the Field Team Leader. Construction activities include excavation of contaminated materials, backfilling, and restoration work. The Field Team Leader shall conduct onsite inspections on a daily basis; inspections shall include but not be limited to construction work, air quality monitoring, and radioactive waste management records. Results of these inspections shall be documented in the field log books for excavation and on the Daily Summary Reports and Punchlists for restoration, and shall be available to the U.S. EPA upon request.**
- B. The Field Team Leader will review all daily reports and construction activities to verify that all work is in compliance with these specifications, and shall note and resolve discrepancies promptly.**
- C. Construction oversight also may be done by the U.S. EPA during work activities conducted under these Specifications. The Respondents shall provide to U.S. EPA, upon request, copies of all documents and information within its or its contractor's possession and/or control relating to activities at the Site.**

3.2 Monthly Reports

Reports describing the work completed for the property described in Section 01010 of these Specifications and Section 2 of the CQA Plan shall be prepared for inclusion into the Monthly Progress Report required by the Statement of Work. These reports shall include at least the following: the work done; any problems encountered and their resolution; analytical data received; developments anticipated during the next reporting period; and a schedule of work to be done.

3.3 Verification Notice

The Respondents shall notify the U.S. EPA when they believe all soils containing more than five 5 pCi/g of radiation above background have been removed from a given area. The sampling and analyses to support this belief shall be made available. The U.S. EPA will review the verification data and provide official notification to the Respondents as to when the excavation can be backfilled.

3.4 Construction Completion Report

Within 60 days after construction (including excavation, restoration and property owner release) is completed, the Respondents will submit a final report (Construction Completion Report) to the U.S. EPA. This report shall include the following:

- A. Information required by 40 CFR §300.165.
- B. Corrected U.S. EPA maps showing the final construction area configuration at the Site.
- C. Final construction specifications.
- D. A list and narrative description of work change authorizations and non-conformance reports.
- E. The actual construction schedule.
- F. Quality control reports.
- G. Pre-final inspection report(s).
- H. All signed construction completion forms and punchlists.
- I. A good-faith estimate of costs incurred in complying with the Statement of Work.
- J. A listing of quantities and types of materials removed offsite or handled onsite; a listing of the ultimate destinations of those materials.
- K. A presentation of the analytical results of all sampling and analyses performed by the Respondents.
- L. A certification that the work was completed in accordance with the requirements of the UAO, Work Plans, the QAPP and these Specifications.

END OF SECTION 01030

Section 01060 Compliance with Codes and Standards

Part 1 - General

1.1 Scope

Work under this project shall comply with the following federal, state, and local codes, standards, rules, and regulations. Other codes, standards, regulations and laws also may be applicable to the work described in these Specifications.

1.2 Related Work

Division 1 Sections of these Specifications.

1.3 Submittals

- A. Comply with all pertinent provisions of Section 01340 of these specifications.
- B. Submit copies of all permits, complete with approval signatures, obtained for the project. Submit completed permits prior to the final inspection for applicable work.

1.4 List of Codes and Standards

- A. American Association of State Highway and Transportation Officials (AASHTO)
- B. American Concrete Institute (ACI)
P.O. Box 19150, Redford Station
Detroit, Michigan 48219
- C. American Railroad Engineering Association Standards
American Railroad Engineering Association
50 F Street Northwest
Washington, D.C. 20001
- D. American Society for Testing and Materials (ASTM)
1916 Race Street
Philadelphia, Pennsylvania 19103
- E. BOCA National Building Code
1990, Eleventh Edition
Building Officials and Code Administrators International, Inc.
4051 W. Flossmoor Road
Country Club Hills, Illinois 60478-5795

- F. Cook County Zoning Ordinances
Cook County Development Department
Zoning Division
- G. Local Natural Gas Codes
BOCA National Mechanical Code 1990 refers to National Fuel Gas,
National Fire Protection Association NFPA 54, 1988 Edition.
National Fire Protection Association
60 Batterymarch Street
Boston, Massachusetts 02110
- H. National Electrical Code (NEC)
NFPA 70, 1990 Edition
National Fire Protection Association (NFPA)
60 Batterymarch Street
Boston, Massachusetts 02110
- I. National Fire Code (NFC)
National Fire Protection Association
Battery March Park
Quincy, Massachusetts 02269
- J. Standard Specifications for Road and Bridge Construction
Illinois Department of Transportation
Bureau of Design and Environment Policy and Procedures Section
Room 334, Administration Building
Springfield, Illinois 62764
- K. Standard Specifications for Water and Sewer Main Construction In Illinois
Latest Edition

Illinois Society of Professional Engineers, Consulting Engineers Council of
Illinois, Illinois Municipal League, and The Associated General Contractors of
Illinois
3219 Executive Park Drive
P.O. Box 2579
Springfield, Illinois 62708
- L. Highway Standards
Illinois Department of Transportation
Bureau of Design and Environment, Policy and Procedures Section
Room 334, Administration Building
Springfield, Illinois 62764

M. BOCA National Mechanical Code

1990, Seventh Edition

Building Officials and Code Administrators International, Inc.

4051 W. Flossmoor Road

Country Club Hills, Illinois 60478-5795

N. Illinois State Plumbing Code

1993 Edition

Illinois Department of Public Health

Plumbing Program

525 W. Jefferson

Springfield, Illinois 62761

O. The Williams-Steiger Occupational Safety and Health Act of 1970 (OSHA).
Public Law 91-596.

Title 40 of the Code of Federal Regulations, Part 1910

Title 29 of the Code of Federal Regulations, Part 1926

P. U.S. Department of Transportation

Office of Hazardous Materials Transportation

400 7th Street, SW

Washington, D.C. 20590-0001

(800) 752-6367

Q. Illinois Environmental Protection Agency

Division of Land Pollution Control

2200 Churchill Road, No. 24

Springfield, Illinois 62706

Part 2 - Products

2.1 General

Unless otherwise specified, "Products" included in these Specifications are intended as a guide as to the level of performance and quality (tolerances, materials and workmanship) expected from materials and supplies used and installed on the work described in these Specifications. The Contractor may suggest alternate materials or supplies which will provide an equivalent level of service; such alternate material and supplies will not be used without approval by the Respondents or their designated representative.

Part 3 - Execution

3.1 Compliance with Codes and Standards

As applicable, the Contractor will comply with the codes and standards given above as noted in other sections of these Specifications and on the construction drawings, and as required by laws and regulations governing the work as described in these Specifications.

END OF SECTION 01060

Section 01340 Submittals

Part 1 - General

1.1 Scope

The Contractor and Respondents shall make submittals required by the contract documents and the UAO, and revise and resubmit them as necessary to comply with the specified requirements.

1.2 Related Work

Individual requirements for submittals are described in pertinent sections of these specifications.

Part 2 - Products

Not used.

Part 3 - Execution

3.1 Submittals

All submittals shall be given to the Respondents or Respondents' Agent. Copies of all submittals shall be given to the Quality Assurance Supervisor. The Respondents and the Quality Assurance Supervisor shall be responsible for reviewing submittals in a timely manner. Some submittals must be made to the U.S. EPA who will be responsible for approving or responding to them.

3.2 Identification of Submittals

- A. Consecutively number all submittals, and uniquely number all resubmittals by including the original submittal number for reference.
- B. Accompany each submittal with a letter of transmittal showing all information required for identification and checking.
- C. On at least the first page of each submittal, and elsewhere as required for positive identification, show the submittal number in which the item was included.
- D. Maintain an accurate submittal log for the duration of the project, showing current status of all submittals to the U.S. EPA. Make the submittal log available to the U.S. EPA for review upon request.

3.3 Timing of Submittals

- A. Make submittals far enough in advance of scheduled dates for installation to provide time required for reviews, for securing necessary approvals, for possible revisions and resubmittals, and for placing orders and securing delivery.**
- B. Allow at least ten (10) working days for review by the U.S. EPA following their receipt of a submittal requiring a response, unless a longer period is indicated by the Specifications for specific items.**

3.4 Review and Revisions

- A. Review by the U.S. EPA, Respondents or the Quality Assurance Supervisor does not relieve the Contractor from responsibility for errors which may exist in the submitted data.**
- B. Revisions. Make those revisions and only those revisions directed or approved by the U.S. EPA and Respondents. Changes to correct inaccuracies or errors may be made, but all such changes must be identified. Promptly resubmit in accordance with Article 3.2 of this Section.**

3.5 Summary of Potential Submittal Requirements to U.S. EPA

The following tables summarize potential submittals which may be requested by the U.S. EPA for this project. Sections represent Specification section numbers. All submittals will be made by or through the Respondent.

Submittal	<u>Reference</u>		Number of Copies Req'd	When Due
	Section No.	Article No.		
Work Order	02010	1.4.C	1	Prior to beginning work at the Site
Air Monitoring Data	UAO		1	With Monthly Report
Project Manpower Forecast	UAO		1	With Monthly Report
Construction Schedule Update	UAO		1	With Monthly Report
Notification of Shipments to Out-of-State Disposal Facility	UAO		1	10 days prior to shipping
Monthly Report	01030 and UAO	1.3.C	1	By the time of the month as directed by U.S. EPA
Document of Contact with Property Owner regarding access			1	with the Work Order
Verification Notice and Sampling Data	01030	1.3.D	1	Upon Successful Completion of Verification Testing
Construction Completion Report	01030 and UAO	1.3.E	3	Within 60 days of finishing construction

3.6 Summary of Potential Permits Required to be submitted to City or County

The following tables summarize potential submittal requirements pertinent to this project for work conducted off-site. Permits are not required for work done on the site itself and adjacent areas necessary to complete the work. Applications for permits applicable to all work (i.e., road access or transportation of materials) will be submitted prior to the beginning of the excavation and restoration phase. Applications for other permits (i.e., construction or repair of public utilities) will be submitted prior to work on that utility.

Potential Permit or Procedural Requirements
Control of Erosion and Stormwater
Transportation of Materials Off-Site
Road Closure or Restricted Access
Repairs to Public Utilities

3.7 Summary of Potential Submittal Requirements to Respondents by the Contractor

Submittal	<u>Reference</u>		Number of Copies Req'd	When Due
	Section No.	Article No.		
Contractor's Manpower Forecast and Construction Schedule Update and Monthly Report	01030	1.3.C	3	By the 10th of the following month
Permits	01060	1.3.B	3	Prior to starting specific work
Construction Completion Report	01030	1.3.E	3	Within 30 days of finishing construction

3.8 Summary of Submittals to Offsites Manager

These submittals require sequentially numbered field letters to document their transmittal.

Submittal	<u>Reference</u>		Number of Copies Req'd	When Due
	Section No.	Article No.		
Daily Reports	01030	1.3.B	3	By 10 am the following day
Shoring and Bracing Designs, when required	02220	1.5B	3	Prior to the start of the applicable work
Landfill and Recycler Information	02010	3.8.B	1	Prior to disposal or recycling
Backfill Material Source, Analysis, and Proctor	02200	1.7.C	3	15 days prior to backfill
Soil Compaction Test Reports	02200	1.7.E	3	Within 7 days of test
Flowable Fill Mix Design	02220	1.5.C	3	Prior to installation
Construction Traffic Routing and Street or Walkway Closing	Work Plan	Appendix D	3	2 Days prior to change
Notice of Planned Interruptions of Utility Services	02840	3.4.A	3	2 days prior to interruption
Concrete Mix Designs	03300	1.6.B	3	Prior to installation
Concrete Strength Test Reports	03300	1.6.D	3	Within 7 days of test and prior to request for payment of applicable work

3.9 Summary of Submittal to Offsites Manager which do not require logging with numbered field letter

Submittal	<u>Reference</u>		Number of Copies Req'd	When Due
	Section No.	Article No.		
Landfill Tickets for disposal of uncontaminated materials	02010	1.4.B	1	With Contractor's Invoice
Staging and Temporary Stockpile Locations	02010	3.7.A	1	Included in Work Order prior to staging or stockpiling
Concrete Truck Tickets	03300	1.7.C	1	At concrete placement
Standard Industry Bill of Lading	02010	3.6.D	1	1 in each truck for each shipment to rail terminal

3.10 Summary of Submittal Requirements to Project Quality Assurance Supervisor

Provide copies of all submittals to the Project Quality Assurance Supervisor. The Project Quality Assurance Supervisor shall not be responsible for approval of submittals, but shall be responsible for noting submittals which do not fulfill all requirements of these Specifications and providing such information to the Respondents.

END OF SECTION 01340

Section 01500 Temporary Facilities and Controls

Part 1 - General

1.1 Scope

The work of this section of the Specifications includes providing, maintaining, and removing at the completion of the work all temporary facilities and controls needed for the project including, but not necessarily limited to:

- A. Temporary utilities.
- B. Supporting facilities.
- C. Temporary access and protection facilities.

1.2 Related Work

- A. Division 1 Sections of these Specifications
- B. Section 02010 - Demolition and Debris Removal
- C. Section 02200 - Contaminated Material Loadout and Earthwork
- D. Section 02220 - Undermining Existing Features
- E. Section 02840 - Site Utilities

Part 2 - Products

Not Used.

Part 3 - Execution

3.1 Protection of Work and Property

- A. Perform work within limits shown in the Work Order in a systematic manner that minimizes inconvenience to the public.
- B. No residence or business shall be cut off from vehicular traffic unless special arrangements have been made.

- C. Maintain in continuous service all existing oil and gas pipelines, underground power, telephone or communication cable, water mains, irrigation lines, sewers, poles and overhead power, and all other utilities encountered along the line of the work, unless other arrangements satisfactory to owners of said facilities and utilities have been made.
- D. Where completion of work requires temporary or permanent excavation and/or relocation of an existing utility, coordinate all activities with owner of said utility and perform all work to their satisfaction.
- E. Protect, shore, brace, support and maintain underground pipes, conduits, drains, and other underground utility construction uncovered or otherwise affected by the work.
- F. In areas where the contractor's operations are adjacent to or near a utility such as gas, telephone, television, electric power, water, sewer or irrigation system and such operations may cause damage or inconvenience, suspend operations until arrangements necessary for protection thereof have been made.
- G. Notify utility offices which may be affected by the work at least two days in advance of any disturbance.
- H. Before exposing a utility, obtain utility owner's permission. Should service of utility be interrupted due to the work, notify proper authorities immediately. Cooperate with said authority in restoring service as promptly as possible.
- I. Do not impair operation of existing sewer systems. Prevent construction material, pavement, concrete, earth, volatile and corrosive wastes, and other debris from entering sewers, pump stations, or other sewer structures. Maintain original site drainage wherever possible.

3.2 Utilities

A. Water

1. The Contractor shall provide necessary temporary water supply such as portable water tanks as required for dust and moisture control during excavation and backfill operations, for the decontamination facilities, and for other construction requirements.
2. The Contractor may make arrangements with the property owner for temporary water from existing facilities.
3. Provide potable water and dispenser or similar facilities for personnel use at each property.

B. Electricity

1. Provide necessary temporary electric services such as portable generators for construction purposes and related activities.
2. The Contractor may make arrangements with the property owner for temporary electrical service from existing facilities.

C. Heating

1. Provide heating necessary for work operations.
2. Open-flame heating devices or oil burning salamander-type devices shall not be used.

3.3 Supporting Facilities

A. Sanitary Facilities

1. Provide temporary sanitary facilities in the quantity required for use by all construction personnel.
2. Maintain these facilities in a sanitary condition at all times.

B. Trash Disposal and Site Cleanup

1. If necessary, provide a minimum of two (2), three (3) cubic yard capacity dumpster for the collection of uncontaminated trash. At reasonable intervals, and not less than once a week, remove trash accumulated in the dumpsters and containers, and dispose at a permitted landfill.
2. Cleaning and trash disposal operations shall comply with all health and safety requirements established for the project.

3.4 Temporary Access and Protection Facilities

A. General Requirements

1. Excavation and restoration operations shall be conducted in phases to ensure minimum interference with roads, walks, entrances, and adjacent occupied facilities. Temporary walkways, railings, ramps, roads, and other facilities will be provided as needed to maintain safe access for the public or the property owner through uncontrolled areas of the site.

2. Where temporary partitions are used in public areas, construct partitions of clean plywood at least 1/2-inch thick, with 2 x 4 double studding at 48 inches on centers vertical and with top and bottom plates. Provide 2 x 4 kicker support system held in place with sand bags.
3. Provide covered passageways where necessary, to ensure safe passage of persons in or near areas of work. Provide barricades and safety lights as needed to control vehicular traffic.
4. Provide temporary weather protection as necessary to prevent damage to existing facilities.

B. Security Measures

1. Prior to beginning construction work at the site, erect security measures (fencing, warning tape, barricades, etc.) to prevent inadvertent access to restricted areas as defined in Section 01020. Provide sufficient area within the boundary of the security measures to contain the work area, and allow safe operation of construction equipment.
2. Security measures shall be, as a minimum, yellow or red hazard flagging suspended on metal fence stakes on 20 feet centers or approved equal. Stable portable post bases may be substituted for embedding posts at the Contractor's option.
3. Install warning signs on security measures at 40 foot intervals. Remove the warning signs when security measures are removed.
4. Relocate security measures when indicated by the Work Order plan, or as the work progresses, to release completed work areas for unrestricted use after a final inspection has been performed.

C. Weather Protection

The Contractor shall furnish and install temporary enclosures as needed to protect construction from damage due to weather or elements, or to maintain suitable temperature during the installation or finishing of work. At the end of each day, all work susceptible to damage shall be protected.

END OF SECTION 01500

Section 01560 Environmental Protection

Part 1 - General

1.1 Scope

- A. This section describes the requirements which may be necessary for minimizing the potential for excavation and restoration activities to affect air, water and land resources. Also included is the management of visual aesthetics, noise, solid waste, radiant energy, and radioactive materials, as well as other pollutants and resources which might be encountered or generated by the Contractor.
- B. For the purpose of this Specification, environmental pollution and damage is defined as the presence of chemical, physical or biological elements or agents which adversely affect human health or welfare, unfavorably alter ecological balances of importance to human life, or unfavorably affect other species of importance to man.
- C. Definitions of Pollutants
 - 1. Sediment: soil that has been eroded and transported by runoff water.
 - 2. Solid Waste: Rubbish, debris, garbage, and other discarded solid materials resulting from industrial, commercial and agricultural operations related to this project.
 - 3. Rubbish: A variety of combustible and noncombustible wastes, including but not limited to, paper, boxes, glass and crockery, metal and lumber scrap, tin cans, and bones.
 - 4. Debris: Includes both combustible and noncombustible wastes such as leaves, tree trimmings, ashes, and waste materials that result from construction or maintenance and repair work.
 - 5. Chemical Waste: Includes petroleum products, bituminous materials, salts, acid, alkalis, herbicides, organic chemical, and inorganic wastes.
 - 6. Sanitary Wastes:
 - a. Sewage: That which is considered as domestic sanitary sewage. Human and animal waste.
 - b. Garbage: Refuse and scraps resulting from preparation, cooking dispensing and consumption of food.

1.2 Related Work

- A. Division 1 Sections of these Specifications**
- B. Section 02010 of these Specifications**
- C. Section 02200 of these Specifications**
- D. Section 03300 of these Specifications**

1.3 Submittals

- A. Comply with pertinent provisions of Section 01340 of these Specifications.**
- B. The Work Order should include descriptions of the kinds and locations of environmental controls which will be implemented. Approval of the Work Order will not relieve the Contractor of the responsibility for adequate and continuing implementation of environmental protection measures.**

Part 2 - Products

Not used.

Part 3 - Execution

3.1 Protection of Land Resources

- A. Prior to construction, the limits of the work will be staked. Mark isolated areas within the limits of the work which are to be saved and protected.**
- B. Protection of Landscaping. Protect other landscaping features (patios, walks, fencing, etc.) by marking or other approved method. Report any damage to such features to the Respondent or their Agent, who will include repairs to these features in amendments to the approved Work Order for the property.**
- C. Convey to all personnel the purpose of marking and protecting all necessary objects.**
- D. Temporary Protection of Disturbed Areas. Retard and control runoff from and run-on to work areas by constructing berms, silt fences, or other measures, to retard and divert runoff and control water and the transport of sediment.**
- E. Erosion and Sedimentation Control. Construct or install temporary erosion and sedimentation control features described in the Work Order. Maintain temporary control measures such as berms, ditches, mulching, and grassing until the work is completed and returned to the control of the property owner.**

- F. Stockpile Management. Limit stockpiles to the areas described in the Work Order. Cover or otherwise manage areas used for stockpiling as described in Article 3.8 of Section 02200 of these Specifications to minimize the potential for contaminating unaffected areas with stockpiled soils or runoff from the stockpiles.

3.2 Protection of Water Resources

- A. Contain waste water from decontamination activities. Such waters will not be allowed to run off affected areas and into natural drainage systems or into constructed systems which empty into natural systems (e.g., storm drains).
- B. Construct, install and maintain surface drainage and sediment control measures described or required by Article 3.1, above.

3.3 Protection of Air Resources

- A. Implement and maintain dust and air pollution control measures as described in Appendix A of the Work Plan, the Work Order for the Site, and Article 3.1, above. For this project, misting or spraying with water will be the principal method of dust control. Visible dust shall be taken as an indication that spraying or increased spraying with water, or some other dust control method, or change in construction activities is necessary.
- B. Implement and maintain air monitoring as described in the QAPP and in Appendix B to the Work Plan.

3.4 Waste Management

- A. All affected (exhibiting radioactivity above the release limits) wastes shall be managed as described in Sections 01010, 02010 and 02200 of these Specifications.
- B. Handle and dispose of unaffected solid wastes in a manner to prevent contamination of the environment. Place solid wastes in suitable containers which are emptied on a regular basis or can be removed on request. As necessary, separate vegetative and demolition waste materials from sanitary wastes. Transport and dispose all such wastes in compliance with federal, state and local regulations.
- C. Store any herbicides, pesticides, cleaning agents, etc. in proper containers. Transport and dispose all such materials in compliance with federal, state and local regulations.
- D. All other unaffected discarded materials shall be managed as described in these Specifications, the Work Plan, the HASP or as directed by the Respondent or their Agent.

3.5 Restoration of Damaged Property

When or where in the execution of the work under this contract any direct or indirect damage is done to public or private property by or on account of any action or omission, neglect, or misconduct of the Contractor, the Contractor, at no additional cost to the Respondent or the owner of the damaged property, shall restore the damaged property to a condition equal to that existing before damage or injury was done.

3.6 Cleanup

On completion of the work, all materials, equipment, supplies, wastes, debris, and other items, used in excavation or restoration activities and which are not to be part of or remain on the property, shall be removed, and the property shall be restored to an appearance equal to that existing before construction or as agreed with the property owner.

END OF SECTION 01560

Section 02010 Demolition and Debris Removal

Part 1 - General

1.1 Scope

- A. This section describes excavation and restoration requirements for existing Site features, including:
 - 1. Salvage Disposition, Storage, and Handling of Property.
 - 2. Demolition of Existing Site Features.
 - 3. Sawcutting.
 - 4. Debris Segregation, Decontamination, Haulage, Storage, and Disposal.
 - 5. Matching and Patch Repairing.
- B. Descriptions for radiological surveying, and reconstruction of landscaping, facilities and structures will be specified in the Work Order.
 - 1. Following these agreements, the requirements of this section will be amended, if necessary, to address the requirements of the agreements.

1.2 Related Work

- A. Division 1 Sections of these Specifications.
- B. Section 02200 - Contaminated Material Loadout and Earthwork
- C. Section 02220 - Undermining Existing Features
- D. ~~Section~~ 02840 - Site Utilities
- E. Section 03300 - Cast-in-Place Concrete

1.3 Salvage Disposition, Storage and Handling of Property

- A. Remove all structures, equipment, facilities, materials and other items called for in the Work Order or that otherwise must be removed to access the work areas and store as directed. Such items shall be removed completely, including appurtenances, and shall be properly protected.
- B. Items designated in the Work Order or within these Specifications to be relocated or reinstalled shall remain the property of the owner.

- C. All materials, equipment, and other items permanently removed from the work area for the proper completion of the excavation and restoration work shall become the property of the Respondents, who shall be responsible for their proper management and disposal.

1.4 Submittals

- A. All submittals shall be made to the Field Team Leader.
- B. Submit landfill tickets for all uncontaminated debris disposed offsite, no more than five (5) days after disposal, *except where dumpsters are emptied directly into collection trucks. The use of dumpsters will be recorded in the field logbook.* Each ticket shall contain at least the information below.
 - 1. Date of disposal.
 - 2. *Estimated* volume or weight of load *if* required by the designated measurement method of the landfill.
 - 3. Description of materials disposed.
 - 4. *Name of wastehauling subcontractor.*
- C. Prior to beginning any work, the Contractor shall submit a plan describing the work for this property, based on the requirements of these Specifications and the final agreements with the owner.

1.5 Health and Safety Conditions of the Work. In addition to the hazards common to demolition, radioactive materials are known to be present at this Site, and may be present in or on slabs/paving, structures, facilities and utilities.

- A. Detailed health and safety requirements for work on the vicinity properties are included in Section 01020 of these Specifications and the HASP.
- B. All demolition work will be done as required by OSHA regulations published in 29 CFR 1910 and 1926. These regulations are included by reference in these Specifications.
- C. Based on existing information, excavation and restoration work can proceed under Level D personal protection conditions (see HASP). Air and soil monitoring and sampling will be done during the conduct of the work to determine if modifications to Level D work conditions are necessary.
 - 1. The Contractor shall be prepared to discontinue work in an area and begin work in an alternate area if monitoring and sampling indicate changes in the work conditions may be necessary and if so directed by the Respondents or their Agent.

2. The Contractor shall be prepared to begin working under changed conditions (greater than or equal to Level D personal protection with appropriate personal, equipment and vehicle decontamination) with minimal delay. Additional requirements which may be necessary if asphalt, concrete, wood, metal or other construction materials containing hazardous materials or levels of radiation above background are encountered are discussed in Section 01020 of these Specifications.

D. The Quality Assurance Supervisor, Field Team Leader, or Health and Safety Coordinator may bar from the Site any person or persons who shows a disregard for health and safety of themselves or others.

1.6 Permits

A. The Contractor shall be responsible for obtaining all permits required for the work and additions described in this section of these Specifications.

B. Copies of all the necessary permits shall be provided to the Project Quality Assurance Supervisor prior to beginning the work.

C. At a minimum, all work shall be done in accordance with the requirements of the permits. The requirements of these permits are included by reference in these Specifications. Where the requirements of the permits and these Specifications are in conflict, the more stringent requirements shall apply.

Part 2 - Products

Not used.

Part 3 - Execution

3.1 General

A. The work performed under these Specifications shall be done as indicated in the Work Order, specified herein, and as required by the permits and the laws, rules and regulations of the City of Chicago, the State of Illinois and the U.S. EPA.

B. The Contractor shall remove existing property features as indicated in the Work Order and shall perform demolition in a manner to allow segregation and proper disposal of contaminated and uncontaminated material. The Contractor must use methods and operations which will minimize the potential for the spread of contamination.

C. It shall be the Contractor's responsibility:

- 1. To maintain adequate safety measures and working conditions (see Section 01020 of these Specifications and the HASP).**
- 2. To take all measures necessary during the performance of the work to protect the entire project area and adjacent properties which would be affected by this work from storm damage, flood hazard, caving of trenches and embankments, and sloughing of material, until final acceptance by the Respondents or their Agent.**
- 3. To maintain completed areas until the entire project area is in satisfactory compliance with the Specifications.**

D. Utility lines and structures indicated on the Drawings which are to remain in service shall be protected by the Contractor from any damage as a result of his operations. Requirements for locating, exposing, protecting, and replacing utilities are provided in Sections 02220 and 02840 of these Specifications.

3.2 Structure Demolition

A. General

- 1. All demolition work will be done in a manner to minimize dust. Dust control measures are described in detail in Sections 01020 and 02200 of these Specifications and in Appendix A of the Work Plan.**
- 2. All staging on the Site, transport, and disposal of demolition debris will be done as described in these Specifications.**
- 3. Demolition debris shall be removed, transported and stored or disposed according to the requirements of these Specifications.**
 - a. Debris materials which are non-radioactive may be staged on the Site for reuse or disposal at a permitted landfill.**
 - b. Debris materials which are radioactive may be temporarily stored on the Site until cleaned for reuse (See Section 3.5) or otherwise prepared for placement in a container for shipment to Envirocare of Utah.**

B. Asphalt and Concrete Paving and Slabs

- 1. The methods used to demolish and remove asphalt and concrete materials shall be at the discretion of the Contractor, as long as the requirements of these Specifications are met. All finished cutting of concrete or asphalt paving or slabs shall be done by sawcutting. The requirements for sawcutting are described in Article 3.3 of this section.**

2. All demolition of pavement and slabs shall be done in a manner to minimize disturbance of the underlying soil. This could include, but not be limited to, pre-breaking or sawing the pavement and slabs, and the measures described in Article 3.3 of these Specifications.
3. Prior to demolition of paving or slabs, the work area will be cleared of any remaining debris.
 - a. The paving, slab or wall will be cut or broken into manageable pieces.
 - b. During cutting or breaking, some metallic materials such as steel rod or wire-mesh reinforcing, embedding fittings or anchor bolts, etc., may be encountered. If necessary, embedded metallic materials shall be separated from the concrete during crushing operations.
 - c. All "hot work" required for cutting metallic materials during demolition or crushing will be done as required by Section 01020 of these Specifications and the HASP.
4. Contaminated concrete paving and slabs may be disposed by size reduction (i.e., cutting into sections that meet disposal criteria) for ultimate shipment to Envirocare.
5. Uncontaminated concrete paving and slabs may be disposed in approved local landfills or used as Common Fill if it meets the requirements of Section 02200, 2.1B.

C. Foundations

1. Demolition of foundations is not anticipated in this work, but if required, will be addressed in the Work Order. If demolition is required, the methods used to demolish and remove foundations shall be at the discretion of the Contractor, as long as the requirements of these Specifications, the permits, and the laws, rules and regulations of the City, County, State, OSHA or the U.S. EPA, whichever are more stringent, are met.
2. All demolition of foundations shall be done in a manner to minimize disturbance of the surrounding and underlying soil. This could include, but not be limited to, pre-breaking or sawing the pavement and slabs, and the measures described in Article 3.3 of these Specifications.
3. Concrete, rock or block foundations may be demolished and reduced in size as described in the foregoing subpart.
4. Foundation walls which serve as retaining walls to support earth or adjoining structures shall not be demolished until such earth has been properly

braced, or adjoining structures have been underpinned to prevent movement. Bracing and shoring shall be evaluated and, if necessary, designed by a qualified Professional Engineer.

5. Adjacent foundation walls and "party" walls to a basement, which are to serve as retaining walls against which fill or debris will be placed, shall be checked for structural strength before they are to be so used. Evaluations and, if necessary, designs of shoring and bracing shall be done by a qualified Professional Engineer.

D. Retaining Walls

1. The methods used to demolish and remove retaining walls shall be at the discretion of the Contractor, as long as the requirements of these Specifications, the permits, and the laws, rules and regulations of the City, County, State, OSHA or the U.S. EPA, whichever are more stringent, are met.
2. All demolition of retaining walls shall be done in a manner to minimize disturbance of the surrounding and underlying soil. This could include, but not be limited to, pre-breaking or sawing the pavement and slabs, and the measures described in Article 3.3 of these Specifications.
3. Shoring or bracing may be necessary during the demolition of retaining walls. Shoring or bracing shall be designed by a qualified Professional Engineer, competent in soils. Shoring and bracing designs shall be submitted to the Respondents or their Agent and the Field Team Leader prior to beginning excavation where their use may be necessary.
4. Concrete, rock or block foundations may be demolished and reduced in size as described in the foregoing subpart.

E. Buildings

Excavation or demolition of contaminated buildings is not anticipated. However, should demolition be required, separate Specifications will be included in the Work Order. This will include issues related to demolition of buildings, such as work with asbestos-containing materials and required engineering survey.

3.3 Sawcutting

- A. The Contractor shall be responsible for all sawcutting necessary for the excavation and restoration of contamination whether described in the Work Order or not. The Contractor shall sawcut concrete, masonry, asphalt paving, and other work as needed, observing the following requirements:

1. The Contractor shall provide liquid or other dust control for all sawcutting of contaminated materials or materials overlying contaminated materials.
2. Finished vertical concrete or masonry cuts shall be made using a track-mounted concrete saw. The finished cut shall be a minimum of three inches deep, in a straight and true line.
3. Finished horizontal concrete or masonry cuts shall be made using a cradle-mounted concrete saw. Make the finished cut a minimum of three inches deep, in a straight and true line.
4. Where portions of masonry will be removed and replaced, masonry excavation and restoration shall be along mortar joints so the finished wall will have the same masonry pattern as the existing.
5. Finished asphalt paving cuts shall be made using an asphalt blade in a cradle-mounted saw. The finished cut shall be a minimum of two inches deep, in a straight and true line.
6. If a clean break cannot be made where new concrete will be replaced against old concrete, provide sawcutting necessary to produce clean edges on the existing concrete.
7. Hand-held demo saws shall not be used to produce finished cuts without prior approval of the Respondents.

3.4 Matching and Patch-Repairing

- A. The Contractor shall observe the following guidelines for matching and patch-repairing.
 1. When existing construction is cut or otherwise disturbed to permit installation of new work, match and patch-repair existing construction so disturbed.
 2. Remove all projections, and point and patch new masonry to match style, color and workmanship of existing masonry.
 3. Paint surfaces to match the adjacent areas. Repaint all walls to the nearest edge or corner.
 4. In newly graded areas, take every precaution and temporary measures necessary to prevent damage from erosion.
 5. Where any settlement or washing of earthwork may occur prior to acceptance of the work, repair and re-establish grades to the required elevations and slopes. This applies to damage to the newly graded areas within the construction limits and damage to adjacent properties by eroded material.

6. Refer to Section 03300 (Cast-in-Place Concrete) for matching and patch-repairing of these items.

B. The Contractor is responsible for using methods and materials which are similar in appearance and equal in quality to those areas or surfaces being repaired, and shall remove areas, surfaces or items which cannot be satisfactorily matched and patch-repaired and replace them with new.

3.5 Decontamination of Items

A. Some contaminated items such as slabs, pavement, and piping, can be decontaminated and disposed in industrial or other landfills. Decontamination of items will include removing the contaminated dust, dirt or encrustations from the surfaces of the items. Decontamination may be accomplished by high-pressure spraying, or manually removing contaminated materials with brushes, soap and water, rags, and miscellaneous hand tools until the items are verified as radiologically suitable for the proposed disposal.

B. Decontamination of contaminated equipment, tools, materials and supplies is described in detail in Section 01020 of these Specifications.

3.6 Contaminated Material Loadout and Transport

A. General Requirements

1. Before beginning contaminated material loadout operations, the Contractor shall construct temporary site drainage facilities and initiate dust control measures. The Contractor also shall construct all decontamination and loadout facilities and establish survey controls.
2. The Contractor shall use equipment and methods that minimize the potential for spillage of materials during loading operations.
3. At a minimum, the loadout shall be cleaned (liquid and nonliquid wastes removed) at the end of every other day. Spilled materials shall be promptly removed from the loading facility if the quantity is such that the material could be picked up and transported out of the loadout facility.
4. All decontamination of equipment shall be done as required herein and by Section 01020 of the Specifications.
5. In no case shall equipment with radioactivity above the release levels be allowed to leave the Site.

B. Loadout

1. All loadout of material will be done as required by these Specifications and the work plan prepared by the Contractor. Loading of trucks and other containers with contaminated soil or debris shall be done only in the loadout or equipment decontamination areas.
2. Contaminated soils and debris will be loaded directly into containers as they are excavated, and the container staged in a clean area for pickup and transport to the rail terminal. Materials will be placed so they do not extend above the sides of the container. Materials protruding above the sides of the container will be pushed down or removed for placement into another container.
3. Rolloff containers will be secured with lids .
4. Drivers shall remain inside the truck with the windows closed or shall exit the truck prior to loading.

C. Decontamination

1. Detailed requirements for the decontamination of trucks and containers are provided in Section 01020 of these Specifications.
2. Following loading in the loadout area, and decontamination if such is necessary, all trucks and containers will be frisked.
3. If frisking shows such is necessary, trucks and containers will be decontaminated by wiping or spraying.
4. Trucks and containers need a final survey prior to unrestricted release from the loadout.

D. Transport

1. Trucks picking up and dropping off containers at the staging areas outside of the loadout need not be decontaminated unless a container spill has occurred.
2. Trucks shall only use the designated route(s) to transport materials from the Site to the rail terminal, and shall obey all signs, speed limits and other traffic laws. Any driver not obeying traffic laws, or the requirements of these Specifications, shall be removed from the work.
3. All trucks shall properly display decal with all information required for transport of contaminated materials.

4. Each truck shall carry the standard industry bill of lading for each shipment to the rail terminal.
5. All truck drivers shall have the training required by 29 CFR 1910.120 and shall be trained in the procedures to be used in the event of an emergency, as described in the Emergency Contingency Plan.

3.7 Storage

A. All storage or stockpiling of materials shall be done as required by Section 02200 of these Specifications and described in the Work Order.

B. On the Lindsay Light II Site:

1. **Non-radioactive materials, including fill, may be temporarily stockpiled (staged) on the Site in the locations noted in the Work Order, or as approved or directed by the Respondent or their Agent.**
 - a. **As necessary, staged non-radioactive materials shall be covered or otherwise managed to control dust.**
 - b. **Non-radioactive materials shall be removed from the Site by the end of the work.**
2. **Radioactive materials may be staged on the Site in locations noted in the Work Order.**
 - a. **If not in the approved Work Order, radioactive materials may be staged on the Site only with written approval from the Respondents or their Agent. These materials shall only be stored on contaminated or specially prepared areas to minimize the potential for contamination of "clean" areas.**
 - b. **All staged radioactive materials shall be removed from the Site by the end of the day, weather permitting. If materials must be left overnight, security will be provided.**
 - c. **Except when work is actively in progress, the staged contaminated materials that are not containerized shall be completely covered with impermeable plastic sheeting or other approved covers.**

C. On the Rail Terminal Site

1. **Loaded and tarped containers will be stored at the rail terminal temporarily until the appropriate train is loaded and dispatched to the permanent disposal facility.**

3.8 Disposal

- A. At a minimum, all materials shall be disposed as required by the permits, these Specifications, and the laws, rules and regulations of the State of Illinois or the U.S. EPA, whichever are more stringent. All materials to be disposed shall be surveyed as required by Section 01020 of these Specifications to determine they are suitable for the intended disposal method and location.
- B. If clean materials are disposed by landfilling or recycling, the Contractor shall provide the Respondents or their Agent and the Field Team Leader with the name of the landfill or recycler.
 - 1. The landfill or recycler must be qualified to receive the waste. The landfill or recycler must provide the Contractor with qualification information.
 - 2. The Respondents or their Agent has the right to reject any landfill which does not meet qualification standards.

3.9 Cleanup

Upon completion of work in this section, all rubbish, debris and excess soils (including fill materials) shall be removed from the job site. All construction equipment and implements of service shall be removed and the entire area involved shall be left in a neat, clean and acceptable condition.

END OF SECTION 02010

Section 02200 Contaminated Material Loadout and Earthwork

PART 1 - GENERAL

1.1 Scope

A. General

1. Detailed descriptions of the landscaping, structures, etc. for the Site are included in the Work Order of which these Specifications are a part.

1.2 Related Work

- A. Division 1 Sections of these Specifications
- B. Section 02010 - Demolition and Debris Removal
- C. Section 02220 - Undermining Existing Features
- D. Section 02840 - Site Utilities
- E. Section 03300 - Cast-In-Place Concrete

1.3 Site Investigation

A. Investigation Reports

Investigation reports prepared by Chicago Dock and Canal Trust and their consultant, and the U.S. EPA are available at the CDCT office in Chicago, the Kerr-McGee office in Oklahoma City, the U.S. EPA office in Chicago, and at other locations. These reports may be used as a guide to conditions on this project as they contain boring summaries and related information depicting surface and subsurface conditions at specific locations at the Site. Surface and soils conditions at other locations may differ from conditions occurring at the boring locations. Therefore, further investigations will be done prior to and during the excavation activities.

B. Contractor's/Subcontractor's Responsibility

The Contractor/Subcontractor shall carefully examine the Site and make all inspections necessary in order to determine the full extent of the work. The Contractor/Subcontractor shall satisfy himself as to the nature, location and conditions of the work, the conformation and condition of the existing ground surface, and the character of equipment and facilities needed prior to and during prosecution of the work. The Contractor/Subcontractor shall satisfy himself as

to the character, quality, and quantity of surface and subsurface materials or obstacles to be encountered. Any inaccuracies or discrepancies between the actual field conditions and the Work Order, or between the Work Order and Specifications, must be brought to the attention of the Offsites Manager in order to clarify the exact nature of the work to be performed.

1.4 Health and Safety

- A. Detailed discussions of the potential hazards and the requirements for minimizing the potential for harm to project and offsite personnel, and to the environment, are provided in Section 01020 and Article 1.5 of this section of these Specifications.**
- B. All work shall be done under the supervision of personnel experienced and qualified for the work.**
- C. All work will be done as required by OSHA regulations published in 29 CFR 1910 and 1926. These regulations are included by reference in these Specifications.**
- D. Sampling of the Site is not complete. Based on preliminary results, sampling and analyses of soils from the Site indicate levels of radioactivity in the soils above background levels. Based on the sampling and surveys, the work can proceed under Level D personal protection conditions. Air and soil monitoring and sampling will be done during the conduct of the work to determine if modifications to Level D work conditions are necessary (see Sections 01020 and 02010 of these Specifications). A complete description of health and safety requirements for this site is provided in the Health and Safety Plan (HASP) for this project.**
 - 1. The Contractor shall be prepared to discontinue work in an area and begin work in an alternate area if monitoring and sampling indicate changes in the work conditions may be necessary and if so directed by the Respondents or his Agent.**
 - 2. The Contractor shall be prepared to begin working under changed conditions (greater than or equal to Level D personal protection with appropriate personal, equipment and vehicle decontamination) with minimal delay. The requirements which may be necessary if asphalt, concrete, wood, metal or other construction materials containing levels of radiation above background are encountered are discussed in Section 02010 of these Specifications.**
- E. The Field Team Leader or Health and Safety Coordinator may bar any person from the site who, in their opinion, shows a disregard for health and safety requirements.**

1.5 Environmental Safeguards and Regulations

- A. The Contractor shall comply with all federal, State, and local regulations, and the requirements of these Specifications at all times to prevent pollution of air, water and soil. Additional requirements for the protection of the environment are provided in Section 01560 of these Specifications.
- B. The Contractor will preserve and protect all structures, equipment, and vegetation (such as trees, shrubs and grass) on or adjacent to the work area, which are not to be removed and which do not unreasonably interfere with the excavation or restoration work. The Contractor will only remove trees when such is required by the Work Order and will avoid damaging vegetation that will remain in place. Limbs or branches of trees broken by the contractor will be trimmed with a clean cut, and the cut painted with a tree-pruning compound.
- C. The Contractor will control air and water pollution as described in these Specifications, the Work Plan, and the QAPP for this project.

1.6 Permits

- A. The Contractor shall be responsible for obtaining all permits required for the work and additions described in this section of these Specifications.
- B. Copies of all the necessary permits shall be provided to the Quality Assurance Supervisor prior to beginning the work.
- C. At a minimum, all work shall be done in accordance with the requirements of the permits. The requirements of these permits are included by reference in these Specifications. Where the requirements of the permits and these Specifications are in conflict, the more stringent requirements shall apply.

1.7 Submittals

- A. All submittals shall be made to the Respondents or their Agent, with copies submitted to the Field Team Leader.
- B. The Contractor shall maintain a log of those submittals directed by the Respondents (See Section 1340 of these Specifications).
- C. Import Backfill Materials
 - 1. The Contractor will submit a list showing materials expected to be imported, and the name(s) and locations of the supplier(s) of each type of material.
 - 2. Submit analyses such as radioactivity, geotechnical, gradation, and proctor test results of backfill materials, and certification of conformance with material specifications as determined by the testing consultant for each material. Frequencies are specified in the Borrow Sampling Procedure

(SOP LLII 220).

3. The above information shall be submitted with the Work Order for the Site for each source. prior to use.

D. Imported Backfill Material Truck Tickets

1. Submit imported backfill material truck tickets no less than five (5) days prior to submittal of application for payment of the applicable items of work. Minimum required information on truck tickets includes the following.
 - a. Date of delivery.
 - b. Material description.
 - c. Truck identification number or license number.
 - d. Gross weight and tare weight or volume of load.
 - e. Supplier name/source.
 - f. Signatures of scale operator and truck driver.
2. Truck tickets without the above information will not be accepted for payment.

E. Soil Compaction Test Report

1. Submit soil compaction test reports indicating test results from the testing consultant. The Contractor shall be prepared to provide preliminary test results within 24 hours of the test. Final test results shall be submitted to the Contractor and available for review within seven days of testing.
2. Test results shall include time and date of test, test methodology, location of test, name of person and firm conducting the testing, and any pertinent information which may affect the test results.

1.8 Definitions

- A. Excavation.** Excavation is defined as reaching the lines, grades, elevations and contamination depths shown in the Work Order or determined by in-place monitoring. Excavation of uncontaminated topsoil, silt, clay, sand, gravel, talus, soft or disintegrated rock, boulder or detached pieces of soil rock or debris shall be included, as well as excavation of contaminated material. During the excavation work, monitoring of radiological contamination of the excavated material will be done by the Respondents.

B. Contaminated Soil

1. Soil which must be excavated, transported, or disposed under special conditions. Soil from these sites may have levels of radioactivity above background. Determining the vertical and horizontal extent of contaminated soil will be the responsibility of the Respondents.
2. Soils containing concentrations of Ra-226 plus Ra-228 greater than five picoCuries per gram (5 pCi/g) of dry soil above natural background averaged over six-inch thick layer are considered radioactively contaminated.

C. Salvaged Excavation Materials. Uncontaminated soil materials from designated areas of the Site suitable for use as common or structural fill which are not otherwise classified as unsatisfactory (see Part 2 of this Section). Unless otherwise directed by the Work Order or the Respondents' Agent, salvaged excavation materials shall be used to backfill designated onsite excavations a minimum of six inches below finished grade.

D. Overexcavation. Excavation of any type of material in excess of the lines, grades or depths indicated in the Work Order or beyond the limits defined by the Work Order or Specifications.

E. Unsatisfactory Fill Materials. Unsatisfactory materials for fill include, but are not limited to, materials containing organic matter, trash, debris, frozen materials, materials containing radioactivity or other hazardous contaminants in excess of regulatory standards, and materials not meeting the criteria of Part 2 of this section. Materials which are unsuitable due to excessive or insufficient moisture or gradation may be used if they can be brought into compliance with the requirements of Part 2 of this section by screening, manipulation, aerating, watering, or blending with other suitable materials. Unsatisfactory fill materials shall not be used.

F. Percent Maximum Density. Percent maximum density is a percentage of the maximum density at optimum moisture obtained by the appropriate test procedure.

G. Stockpile Construction. Stockpile construction is defined as construction of a stabilized fill which will serve as a temporary storage stockpile constructed of contaminated or uncontaminated materials.

H. Subgrade Preparation. Subgrade preparation includes fine grading, scarification and compaction, of existing ground, upon which additional materials will be placed.

1.9 Applicable Publications. The publications listed below form a part of these Specifications to the extent referenced. The publications are referred to in the text by the basic designations below.

1. American Society for Testing and Materials standard methods of testing. Hereinafter designated as ASTM. The letters and numbers following ASTM (e.g., D698) refer to a particular test.
2. Standard Specifications for Road and Bridge Construction, Illinois Department of Transportation. Hereinafter referred to as State Specifications.
3. Standard Specifications for Water and Sewer Main Construction in Illinois, Fourth Edition.
4. City of Chicago Zoning Ordinances.

1.10 Quality Assurance

- A. The Respondents shall make available soil-testing services, either through its own forces or through a soils-testing consultant. The Respondents shall be responsible for taking soil samples and performing moisture-density, gradation, and other tests to ascertain the completed work is in compliance with these Specifications. Samples may be taken at the place of excavation, stockpiles, or from the fill itself. The Respondents shall conduct density and other tests on the fill as required by these Specifications. The Contractor shall assist the Respondents as necessary to enable sampling and testing.
- B. The Field Team Leader shall be a person qualified and experienced in the work described in these Specifications.
- C. **By Contractor/Subcontractors**
 1. All work shall be done under the supervision and control of experienced and qualified personnel, competent in the areas of expertise required for the work described in these Specifications and other documents.
 2. The Contractor, at his discretion, may have such tests and inspections as he may desire performed by other qualified personnel or independent testing services, for his guidance and control of the work. The cost for such tests and inspections shall be borne by the Contractor. The Quality Assurance Supervisor will consider the results of such testing in determining whether work has been properly done, but the approval of work shall be made by the Respondents or their Agent.
- D. **Applicable Criteria, Tests and Standards**
 1. **For Excavation of Radioactive Soils.** Detailed descriptions of the testing methods and equipment for radioactive soils are described in the Verification Sampling Plan. All soils containing concentrations of Ra-226 plus Ra-228

greater than five pCi/g of dry soil above background, averaged over a six-inch layer, shall be removed.

2. For Disposal of Radioactive Soils. All contaminated soils will be disposed in the manner approved by the U.S. EPA. At present, this is to transport the material to the local rail terminal for shipment and ultimate burial in the Envirocare of Utah landfill in Clive, Utah.

3. For Site Earthwork

- a. Except for grading and fill under pavement, slabs or structures, surfaces shall be excavated, or filled or graded to plus or minus 0.2 feet ($\pm 0.2'$) of line, slope and elevation shown in the Work Order, provided in these Specifications, or as directed by the Offsites Manager or Field Team Leader.
- b. Areas under pavement, slab or structures shall be filled and/or graded to ± 0.1 feet.
- c. The Contractor will provide survey control for establishing and maintaining excavation and fill. Cut and fill stakes will be placed as necessary, but at least on 50-foot centers, to control excavation and fill. *All surveys required to meet City of Chicago earthwork permit requirements shall be performed by a licensed land surveyor.* Other surveying will be done by an experienced line and grade surveyor.
- d. Following completion of the work, the Site shall be surveyed to confirm all regrading and reconstruction work has been done to proper line and grade.

4. Compaction

- a. Compaction of backfilled common materials shall be to at least 90 percent of maximum density (standard proctor - ASTM D698) for areas not covered by structures, paving or slabs, to at least 95% of maximum density for areas to be covered by paving or slabs, and to at least 95% for areas under structures and utilities.
- b. Compaction of backfilled select or structural materials shall be to at least 92% of maximum density (standard proctor - ASTM D698) for areas not covered by structures, paving or slabs, to at least 95% of maximum density for areas to be covered by paving or slabs, and to at least 95% for areas under structures and utilities.
- c. Maximum densities and optimum moisture information can be obtained from borrow area operators; if this information is not available, the Contractor shall obtain samples representative of all soils to be used for common backfill and provide them to the Respondents or their Agent for testing. Test samples will be provided before backfilling begins.

5. Compaction Testing shall be done on at least 50-foot centers or at least once per lift. Compaction will be tested and determined by competent personnel using methods such as nuclear density gauges (if proper calibration can be achieved), sand cones, or other methods. Compaction work shall be sufficiently observed and all areas of a lift shall be visually inspected by the Respondents or their Agent and the Field Team Leader so they can state their opinion that areas not tested for compaction have been compacted as tested areas.
6. Soils testing. All soils testing (gradations, liquid limits, etc.) will be done using American Society for Testing and Materials (ASTM) procedures and methods.
7. For Cleanup. The Contractor shall remove all rubbish, debris, junk, temporary materials, and any surplus excavated materials from the Site, as directed by the Respondents or their Agent. Excavation and proper disposal of these materials and the restoration of staging and storage areas and temporary roads to the satisfaction of the Respondents or their Agent shall be a condition for final acceptance.

PART 2 - PRODUCTS

2.1 Backfill Materials

- A. General - Fill materials shall be obtained from suitable stockpiles or borrow as defined in these Specifications. Materials containing organic (except topsoil), perishable, spongy, frozen, expansive or other deleterious materials shall not be acceptable.
- B. Materials for Common Fill shall consist of any material imported or excavated from the cut or other borrow sources that, in the opinion of the Respondents or their Agent, is suitable for use in constructing fills. The material shall contain no rocks or hard lumps greater than four (4) inches in size and shall contain at least 40 percent of material smaller than 1/4-inch sieve opening in size. No material of a perishable, spongy, or otherwise improper nature shall be used in filling.
- C. Imported Fill
 1. Roadbase materials shall conform to State Specifications Section 704.
 2. Crushed Rock or Stone for use as fill shall conform to State Specifications Section 704.01.
 3. Fine Aggregate or Sand shall conform to State Specifications Section 703.04.

4. Structural Fill under building slabs, ramps, and stairs shall conform to State Specifications Section 704.04, CA-6 or CA-10.
 5. Selected Granular Backfill shall conform to Section 20-2.21C of the Standard Specifications for Water and Sewer Main Construction in Illinois, FA-1 or FA-2.
- D. Material placed within 24 inches of rough grade shall be select material that contains no rocks or hard lumps greater than four (4) inches in size and that swells less than 3% when compacted as hereinafter specified for compacted fill.
- E. Soils testing
- a. Prior to use, all off-site soil sources shall be tested as follows:
 - (1) Radioactivity Material must be tested for radioactivity and found to be within background ranges (3.7 pCi/g as established by the U.S. EPA in Tech Memo date March 15, 1995).
 - (2) Engineering Classification ASTM D2487
 - (3) Standard Proctor Compaction ASTM D698
 - b. Provide one series of tests for each 10,000 cubic yards of borrow soil used. At least one series of tests will be obtained from each borrow source to be used.
 - c. Testing of potential on-site soil backfill is described in the Field Sampling Plan.

PART 3 - EXECUTION

3.1 General

- A. The work performed under these Specifications shall be constructed to the lines, grades, elevations, slopes and cross-sections indicated in the Work Order, specified herein, and/or directed by the Respondents or their Agent. Slopes, graded surfaces, and drainage features shall present a neat uniform appearance upon completion of the work.
- B. It shall be the Contractor's responsibility:
 1. To maintain adequate safety measures and working conditions.
 2. To take all measures necessary during the performance of the work to

protect the entire project area and adjacent properties which would be affected by this work from storm damage, flood hazard, caving of trenches and embankments, and sloughing of material, until final acceptance by the Respondents or their Agent.

3. To maintain completed areas until the entire project area is in satisfactory compliance with the Specifications.
- C. Utility lines and structures indicated in the Work Order which are to remain in service shall be protected by the Contractor from any damage as a result of his operations.
1. Where utility lines or structures not shown in the Work Order are encountered, the Contractor shall report them to the Respondents or their Agent before proceeding with the work.
 2. Unless their excavation is necessary to allow work to proceed or as a result of contamination, the Contractor shall bear the cost of repair or replacement of any marked utility lines or structures which are broken or damaged by his operations.
 3. All repair work, including backfilling, shall be done as required by the governing utility or agency. The Contractor shall contact the governing utility or agency and determine the requirements for properly completing the work. A description of the requirements may be requested to be provided to the Respondents and the Field Team Leader before any work is done.

3.2 Excavation and Restorations, Clearing and Grubbing

- A. **Clearing.** Clearing consists of the complete excavation of objectionable materials and obstructions above and below the ground surface, including tree stumps, brush, grass, vegetative matter and other objectionable materials within the project limits. All brush and organic material shall be removed before placing any earth fill unless the earth fill to be placed is topsoil.
- B. **Grubbing.** Grubbing consists of the complete excavation of stumps, including tap roots or lateral roots 1-1/2 inches or more in diameter, and the excavation of brush, grass or weeds to depths below the natural ground as specified herein. Stumps shall be grubbed to a depth of 3 feet and grass or weed shall be grubbed to a depth of 12 inches below the natural ground surface, or to the depths as determined in the field by the Respondents or their Agent at the time of construction.
- C. **Protection.** Existing items not designated to be demolished or removed shall be protected from damage. Any such item damaged by the Contractor shall be restored or replaced immediately at the Contractor's expense.

- D. Debris and Surplus Material. All debris and surplus material resulting from clearing, and grubbing shall be removed from the site and properly managed by the Contractor. The requirements for managing concrete and asphalt materials are described in Section 02010 of these Specifications.

3.3 Dust Control

The Contractor shall take all steps practical to control dust arising from the construction activity. Detailed discussions of the requirements and potential methods for controlling dust are described in Appendix A of the Work Plan.

3.4 Control of Drainage Water

- A. The Contractor shall control drainage water in the area of construction operations, and control storm water and wastewater reaching the construction area from any source, so that no damage will be done to the work or to the environment. The Contractor shall be responsible for any damages to persons or property on or off the construction site due to such drainage water or to the interruption or diversion of such storm water or wastewater on account of his operations.
- B. Surface grading shall be done as may be necessary to prevent surface water from flowing into excavations.
1. Any water accumulating therein shall be removed by pumping or by other approved methods.
 2. Any water accumulating in a work area which may be contaminated will be tested prior to disposal. If contaminated, such water will be disposed as directed by the Respondents or their Agent.
 3. Any water which is the result of the Contractor's failure to properly control drainage will be removed and disposed at the Contractor's expense.

3.5 Excavation

A. General

1. The locations of surveyed benchmarks and estimated depths of cut for beginning the work are shown in the Work Order. The Contractor shall be responsible for providing additional staking and surveying, including both horizontal and vertical controls, to ensure the Work is done to the standards of these Specifications. The Offsites Manager and Field Team Leader will be available to assist and advise the Contractor.
2. The Contractor shall perform all excavation necessary or required as shown in the Work Order, or required by these Specifications or the Respondents or

their Agent. The excavation shall include the disposal or stockpiling of all materials of whatever nature encountered, which shall include both contaminated soil excavation and common soil excavation when both are present, and shall include the furnishing, placing, and maintaining of shoring and bracing necessary to safely support the sides of the excavations.

3. If the horizontal and vertical limits of excavation, as determined by radiological testing, are less than shown in the Work Order, the Contractor shall excavate only those materials necessary to achieve compliance with the standards of these Specifications.
4. If the horizontal and vertical limits of excavation, as determined by radiological testing are greater than shown in the Work Order, the Contractor shall extend the limits of excavation as necessary to achieve compliance with the standards of these Specifications.
5. Excavated material shall be placed a sufficient distance from the edge of the excavation to avoid cave-ins or bank slides. In no case shall excavated materials be placed closer than three feet to the edge of the excavation.
6. Shoring and bracing, if necessary, shall be designed by a qualified Professional Engineer competent in soils engineering.
7. The work also shall include all pumping, ditching and other required measures for the removal or exclusion of water.

B. Contaminated Soils

1. Interpretation of the Work Order

- a. The Work Order indicates the estimated horizontal and vertical extent of a contaminated deposit.
- b. Depths of contaminated and uncontaminated soils indicated in the Work Order represent the total estimated depth from the ground surface to the base of the contamination. The different depths shown across a given deposit are an indication of how the actual contamination depths might be expected to change throughout a given deposit.
- c. Information in the Work Order indicates the existing surface cover material. Unless otherwise indicated in the Work Order, the replacement surface cover shall match existing.

- d. All contaminated materials, including clay, silt, sand, gravel, cobbles and boulders, and rock will be excavated. The Contractor shall be prepared to conduct whatever excavation is necessary to remove contaminated materials.

2. Excavation Procedures

- a. If possible, contaminated material shall be removed from outlying areas and boundaries of contaminated areas, working toward the equipment decontamination and loadout facilities, to minimize the potential to contaminate "clean" areas.
- b. Truck or container loading shall be done only on ground contaminated and designated for cleanup or on the equipment decontamination pad or other area specially prepared for such work. Care should be taken to avoid spilling during loading.
- c. Contaminated (see Subpart 1.8, B, Definitions of this section) and uncontaminated soils shall be separated during excavation and kept separate during loading, transport and stockpiling to minimize the potential for cross-contamination.
- d. Excavations shall be performed carefully to minimize the potential for mixing with underlying soils. Also, cleated or crawler-type equipment shall not be allowed without prior approval of the Respondents or their Agent.
- e. Excavations will be radiologically monitored and surveyed by the radiologic technicians to determine if additional material must be removed. Detailed descriptions of the radiological monitoring requirements during excavation are provided in Appendix C (SOPs) of the QAPP.
- f. The Contractor shall excavate contaminated and uncontaminated soil to within three inches of the design or estimated depth. From this point, excavation should proceed in no greater than six-inch lifts to the depths indicated in the Work Order. After excavation of each lift, the Respondents will radiologically monitor the excavation and delineate additional excavation required (see the Field Sampling Plan).
- g. Exceptions to these requirements must be approved in writing by the Respondents or their Agent and provided to the Field Team Leader. The Contractor will not be paid for removing extra quantities resulting from a deviation from the above requirements, unless a specific deviation has received prior written approval.

D. Other

Uncontaminated material, including clay, silt, sand, gravel, cobbles and boulders and rock, may need to be removed for slopes on excavations, to expose contaminated soils, structures or facilities, or to facilitate work to remove contaminated soils, structures or facilities. Common materials removed from such areas may be used for backfill if they meet the requirements for fill material. If unsuitable, they shall be removed, transported and disposed as surplus excavation.

3.6 Contaminated Material Loadout and Transport

A. General Requirements

1. Before beginning contaminated material loadout operations, the Contractor shall construct temporary site drainage facilities and initiate dust control measures. The Contractor also shall construct all decontamination and loadout facilities and establish survey controls.
2. The Contractor shall use equipment and methods that minimize the potential for spillage of materials during loading operations.
3. At a minimum, the truck loadout shall be cleaned (liquid and nonliquid wastes removed) at the end of every day. Spilled materials shall be promptly removed from the loading facility if the quantity is such that the material will be picked up and transported out of the loadout facility (e.g., dirt clods which could stick to tires).
4. All decontamination of equipment shall be done as required by Section 01020 and this section of these Specifications.

B. Loadout

1. All debris, such as concrete, asphalt, etc., shall be managed as described in Section 02010 of these Specifications.
2. All loadout of material will be done as required by these Specifications and the Work Order prepared by the Contractor. Loading of trucks and other containers shall be done only in the loadout or equipment decontamination facilities.
3. Unless staging areas have been selected by the Contractor and approved by the Respondents or their Agent, soils and debris will be loaded directly into trucks or containers as they are excavated, for transport to the rail terminal. Materials will be placed so they do not extend above the sides of the truck bed or container. Materials protruding above the sides of the truck or

container will be pushed down or removed for placement into another truck or container by loading equipment or personnel.

4. Truck beds and containers will be tightly covered with tarps.
5. Truck drivers will generally not enter the Contamination Reduction Zone, but shall remain inside the truck when such entry is required.

C. Decontamination

1. After a truck or container has been loaded and tarped, it will be checked for contamination. The truck tires, body and outside of the bed and the outside of the container will be frisked to determine if contaminated soils are present. If frisking does not detect any contamination, the equipment may be released for travel.
2. If frisking does detect contamination the truck or container will be decontaminated by wiping or spraying.
3. Following decontamination, all trucks and containers shall be frisked for release. If any radioactivity above release levels (see Table 02200-1 at the end of this section) is found, decontamination of those areas will be continued. If spraying or wiping is ineffective in removing contamination, brushes or other means shall be used until release levels are achieved. In no case shall a truck or container with radioactivity above the release levels be allowed to leave the site.
4. After containers are loaded and frisked for release, they shall be staged in a clean area on the site. The trucks used to transport the containers to the rail yard will not need to be frisked prior to leaving the site, as long as the transport trucks do not enter the Contaminant Reduction Zone.

D. Transport

1. Trucks shall use only the designated route(s) to transport containers with contaminated materials from the Site to the rail terminal, and shall obey all signs, speed limits and other traffic laws. Any driver not obeying traffic laws, or the requirements of these Specifications, shall be removed from the work.
2. All trucks shall properly display a decal with all information required for transport of contaminated materials.
3. Each truck shall carry the standard industry bill of lading for each shipment.
4. All truck drivers shall have the training required by 29 CFR 1910.120 and shall be trained in the procedures to be used in the event of an emergency (see Section 01020, Articles 3.2 and 3.7, of these Specifications, and the

Emergency Contingency Plan).

3.7 Fill

A. General

1. Unless otherwise specified, fill material shall be compacted by the Contractor to a density that is not less than 90% of the maximum density, standard proctor (ASTM D698).
2. The upper 18 inches of fill material placed in lawns and other areas to be revegetated shall not be compacted beyond that density needed to provide a stable land surface.
3. In areas where contaminated materials have been removed, the Contractor shall not begin backfilling until a radiological survey has been completed as described in Sections 01010 and 02010 of these Specifications and Appendix E to the Work Plan.
4. All fill shall be final graded to the requirements of Part 1 of this Section. After backfilling is completed, the fill (including topsoil) shall be graded to blend with existing contours where future construction will not be done.

B. Preparing Areas to be Filled

1. All vegetable matter and coarse material which might prevent compaction shall be removed by the Contractor from the surface upon which the fill is to be placed. Any loose and porous soils shall be removed or compacted to a depth specified by the Respondents or their Agent. The surface shall then be plowed or scarified until the surface is free from uneven features that would tend to prevent uniform compaction by the equipment to be used.
2. Where fills are constructed on hillsides or slopes, the slope of the original ground on which the fill is to be placed shall be stepped or keyed by the Contractor. The steps shall extend completely through the soil mantle, if any, and into the underlying formation materials.
3. Fill shall not be placed on ground which has frozen, unless the ground can be worked (e.g., scarified and recompacted) to remove the frost.

C. Placing and Spreading Fill Material

1. The Contractor shall not commence backfilling until a radiological survey of the excavation has been completed which verifies all contaminated materials have been removed as required by these Specifications, and the Field Team Leader has provided the Contractor with verbal authorization to begin backfilling.

2. Fill shall be placed to the line, elevation and grade as required by these Specifications, shown in the Work Order, or described or shown in the Contractor's Work Order for this Site. Unless otherwise approved in writing by the Respondents or their Agent, the Contractor shall use fill stakes to guide backfilling.
3. Salvaged soil materials shall be used for backfilling unless determined unsuitable by the Respondents or their Agent.
4. When conditions require that contaminated soil will be left in place, backfill will be placed against contaminated soils. In this situation, a six-mil polyethylene barrier will be placed to mark the separation between the soils and to minimize the potential for contaminated soils to fall into the "clean" area. Care will be taken during subsequent operations to prevent contaminated soils from mixing with "clean" soils.
5. Fill material to be compacted shall be placed by the Contractor in one foot , even, continuous layers. Each layer shall be spread evenly and shall be thoroughly mixed during the spreading to obtain uniformity of material in each layer.
6. Uniform moisture distribution in the fill to be compacted shall be obtained by discing, blading or other approved methods prior to compaction of a layer.
 - a. When the moisture content of the fill material is insufficient to achieve specified density requirements, water shall be added by the Contractor until the moisture content is as specified.
 - b. When the moisture content of the fill material is too high to achieve specified density requirements, the fill material shall be aerated by the Contractor by blading, mixing, or other satisfactory methods until the moisture content is reduced.
7. Unless otherwise shown in the Work Order, the Contractor shall maintain a minimum of 10 feet of separation between excavation of contaminated soils and placement of clean fill.
8. Fill on City of Chicago street rights-of-way shall be done as required by City of Chicago Standard Specifications.

D. Compaction

1. After each layer has been placed, mixed and spread evenly, it shall be thoroughly compacted by the Contractor to the required density (see below).
2. Compaction shall be accomplished by sheepfoot rollers, vibratory rollers,

multiple-wheel, pneumatic-tired rollers or other types of acceptable compacting equipment.

- a. Selection of compaction equipment will be at the discretion of the Contractor. Equipment shall be of such design that it will be able to compact the fill to the specified density.
 - b. In areas not accessible to or suitable for larger self-propelled roller or vibratory equipment (e.g., small areas, within 12 inches over the top of utilities, etc.), the maximum loose-layer thickness will be four inches.
 - c. Compaction shall be continuous over the entire area and the equipment shall make sufficient passes over the material to ensure that the desired density has been obtained over the entire area.
 - d. The surface of fill slopes shall be compacted so that the slopes are stable and there shall be no excessive loose soil on the slopes.
3. Roadbase backfill shall be compacted to at least 95% of maximum density (ASTM D698 - standard proctor).
4. Common backfill shall be compacted as follows:
- a. To at least 90% of maximum density (ASTM D698 - standard proctor) for all areas except as noted below.
 - b. To at least 95% of maximum density (ASTM D698 - standard proctor) for all areas to be covered with paving.
 - c. To at least 95% according to ASTM D698 in City of Chicago street right-of-ways where asphalt will be placed, except for the upper six-inch layer which will be compacted to not less than 100%.
5. Structural fill under buildings, slabs, ramps and stair shall be compacted to at least 95% of maximum density (ASTM D698).
6. Compaction will not be required in the upper 18 inches of soil placed in lawns or other areas to be revegetated.
- E. When an area has been prepared to receive concrete or asphalt, applicable moisture and density requirements shall be maintained in the upper layer until the surface construction is completed.
- F. The Contractor shall provide and maintain adequate erosion and drainage control facilities during the construction of the fill areas. The erosion control facilities shall be maintained in optimum condition until the work is complete. The facilities shall be inspected following significant rainfall, repairs made and

excess sediment removed. It shall be the Contractor's responsibility to prevent the discharge of sediment offsite or to adjacent water courses.

- G. Backfill around Utilities. In any case where utilities are disturbed or exposed, all repair work shall be done in accordance with the requirements of the utility, or the governing agency (see Specification 02840 Site Utilities).

3.8 Storage (Stockpiling)

A. On the Site

1. Non-radioactive materials, including fill, may be temporarily stockpiled on the Site in the locations noted in the Contractor's approved Work Order, or as approved or directed by the Respondents or their Agent.
 - a. As necessary, staged non-radioactive materials shall be covered or otherwise managed to control dust.
 - b. Non-radioactive materials shall be removed from the vicinity of the property by the end of the work.
2. Radioactive materials may be staged (temporarily stored) on the Site in locations noted in the Contractor's approved Work Order.
 - a. If not in the approved Work Order, radioactive materials may be staged on the Site only with written approval from the Respondents or their Agent. These materials shall only be stored on contaminated or specially prepared areas to minimize the potential for contamination of "clean" areas.
 - c. Except when work is actively in progress, the staged materials shall be completely covered with impermeable plastic sheeting or other approved covers.

3.9 Disposal

- A. At a minimum, all materials shall be disposed as required by the permits, these Specifications, and the laws, rules and regulations of the U.S. EPA, State of Illinois, and the State of Utah.. All materials disposed off the Site shall be surveyed as required by Section 01020 of these Specifications to determine they are suitable for the intended disposal.**
- B. If the materials are disposed by landfilling or by recycling, the Contractor shall provide the Respondents or their Agent and the Offsites Manager with the name of the landfill or recycler.**
 - 1. The landfill and recycler must be qualified to receive the waste. Qualification information must be provided for the landfill or recycler, by the Contractor.**
 - 2. The Respondents or their Agent has the right to reject any landfill or recycler which does not meet qualification standards.**

3.10 Landscaping

Following completion of backfilling to proper line, elevation and grade, the Contractor shall return to the site and reinstall or replace all designated items to at least original condition, or as otherwise agreed by the Respondents and the property owner. This includes paving, slabs, fences, retaining walls, sprinkler systems, sod, shrubs, bushes, trees and any other appurtenant landscaping, facilities and structures which were removed for or damaged by the work.

3.11 Surveying

- A. A baseline will be established for the Site. This baseline will be tied to the previous U.S. EPA survey done for the property.**
- B. Items including, but not limited to, the following will be located or identified in relation to the baseline.**
 - 1. Visible property boundaries.**
 - 2. Landscaping.**
 - 3. Facilities.**
 - 4. Structures.**
 - 5. Utilities.**

6. Limits of radioactive contamination. Using the results of previous investigations and the baseline, sufficient stakes or markers will be placed to visibly mark the limits so any contaminated soil can be properly removed.
- C. The baseline, as above, and the previous surveys also will be used to locate grids for verification surveying. The size of the grids will depend on the location and the extent of contamination.
- D. The work for locating items such as the above can be done with equipment and materials such as the following:
 1. Theodolite.
 2. Compass.
 3. Cloth or steel measuring tape.

3.12 Cleanup

Upon completion of work in this section, all rubbish, debris and excess soils (including fill materials) shall be removed from the job site. All construction equipment and implements of service shall be removed and the entire area involved shall be left in a neat, clean and acceptable condition. Proper cleanup of the properties shall be a condition of acceptance of the work and final payment.

RELEASE CRITERIA

From U.S. NRC, Regulatory Guide 1.86, Table 1

<u>Nuclide</u> ^a	<u>Average</u> ^{b, c}	<u>Maximum</u> ^{b, d}	<u>Removable</u> ^{b, e}
U _{nat} , U ₂₃₅ , U ₂₃₈ , and associated decay products	5,000 dpm α per 100 cm ²	15,000 dpm α per 100 cm ²	1,000 dpm α per 100 cm ²
Transuranics, Ra ₂₂₆ , Ra ₂₂₈ , Th ₂₃₀ , Th ₂₂₈ , Th ₂₃₀ , Pa ₂₃₁ , Ac ₂₂₇ , I ₁₂₅ , and I ₁₂₉	100 dpm per 100 cm ²	300 dpm per 100 cm ²	20 dpm per 100 cm ²
Th _{nat} , Th ₂₃₂ , Sr ₉₀ , Ra ₂₂₃ , Ra ₂₂₄ , U ₂₃₂ , I ₁₂₆ , I ₁₃₁ , and I ₁₃₃	1,000 dpm per 100 cm ²	3,000 dpm per 100 cm ²	200 dpm per 100 cm ²
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr ₉₀ and others noted above.	5,000 dpm β-γ per 100 cm ²	15,000 dpm β-γ per 100 cm ²	1,000 dpm β-γ per 100 cm ²

- a Where surface contamination by both alpha- and beta-gamma-emitting nuclides exists, the limits established for alpha- and beta-gamma-emitting nuclides should apply independently.
- b As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.
- c Measurements of average contaminant should not be averaged over more than one square meter. For objects of less surface area, the average should be derived for each such object.
- d The maximum contamination level applies to an area of not more than 100 cm².
- e The amount of removable radioactive material per 100 cm² of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface should be wiped.

END OF SECTION 02200

Section 02220 Undermining Existing Features

PART 1 - GENERAL

1.1 Scope

A. This section describes the requirements for undermining and backfilling existing structures, facilities and utilities.

B. Description

Work on this Site may require excavation to or below existing utilities, existing pavement, areas requiring shoring and bracing, and other facilities.

C. The Contractor shall provide labor, equipment, tools, materials, and services needed to accomplish all site preparation, earthwork and incidental appurtenant work as described herein or shown on the drawings.

1.2 Related Work

A. Division 1 Sections of these Specifications

B. Section 02010 - Demolition and Debris Removal

C. Section 02200 - Contaminated Material Loadout and Earthwork

D. Section 02840 - Site Utilities

E. Section 03300 - Cast-in-Place Concrete

1.3 Health and Safety

A. In addition to the hazards common to demolition, radioactive materials are known to be present in the soils of the Site, and may be present in slabs/paving, structures, facilities and utilities. Detailed discussions of the potential hazards and the requirements for minimizing the potential for harm to project and offsite personnel, and to the environment, are provided in Section 01020 of these Specifications and in the HASP for this project.

B. The work, by its nature, may create a confined space work situation, especially in the process of excavation. Planning needs to be in full compliance with work procedures in confined space areas, including the training of workers to recognize confined space situations that can be created during excavation activities.

- C. All work shall be done under the supervision of personnel experienced and qualified for the work.

1.4 Quality Assurance

- A. All work shall be done by and under the supervision of qualified and experienced personnel.
- B. All work shall be done at least to the requirements, and using the materials and methods, described in these Specifications.
- C. The Respondents shall provide an Offsites Manager to review and oversee the work.

1.5 Submittals

- A. All submittals shall be made to the Respondents or their Agent, with copies to the Quality Assurance Supervisor.
- B. Prior to installing shoring and bracing, the Contractor shall obtain the services of a qualified Professional Engineer, licensed in Illinois and competent in soils work, to design and oversee the installation of the shoring and bracing. All designs shall be submitted to the Respondents or their Agent.
- C. Prior to backfilling, the Contractor shall submit a design for the mix of the flowable fill required for backfilling as described in this section and as necessary to provide proper support for undermined structures, facilities, etc.
 - 1. This design shall be submitted to the Respondents or their Agent.
 - 2. Submit the design at least one week prior to use.

PART 2 - PRODUCTS

- 2.1 **Flowable Fill** at a minimum shall be prepared using the materials and mix design below.

- A. Cement shall be Portland Cement conforming to ASTM C150, Type I or Type II.
- B. Flyash shall conform to the requirements of ASTM C618, Class C, and shall come from a source approved by the Respondents or their authorized Agent.
- C. Water shall meet the requirements of ASTM C685.
- D. Minimum Mix Design

Quantity of Dry Materials per Cubic Yard

Cement	100 pounds
Fly Ash	900 pounds
Fine Aggregate	2,100 pounds

These quantities, mixed with approximately 50 gallons of water, should yield approximately one cubic yard (CY) of flowable fill.

E. Batching and Mixing

1. Mix proportions shall be controlled by weight and volume batching as described above and to the requirements of ASTM C94 and C685.
2. Use batching and mixing equipment capable of proportioning and mixing all ingredients at a rate to provide adequate production and with an accuracy to assure uniformity of batches.

2.2 Roadbase

Roadbase materials shall conform to the materials requirements of Part 2 of Section 02200 of these Specifications.

2.3 Fine Aggregate

Fine aggregate or sand shall conform to the materials requirements of Part 2 of Section 02200 of these Specifications.

2.4 Low-Slump Concrete

- A. Provide a mix design based on strengths of the approved materials and meeting the requirements stated in this Specification and in the Work Order.
- B. Concrete Strengths and Slump. For low-slump concrete (dry pack mix to fill voids resulting from undermining as specified in Section 02220 of these Specifications): One-inch slump maximum, 3,500 psi at 28 days.

PART 3 - EXECUTION

3.1 General

- A. The work performed under these Specifications shall be constructed to the lines, grades, elevations, slopes and cross-sections indicated on the Drawings, specified herein, and/or directed by the Respondents or their Agent. Slopes, graded surfaces, and drainage features shall present a neat uniform appearance upon completion of the work.

B. It shall be the Contractor's responsibility:

- 1. To maintain adequate safety measures and working conditions.**
- 2. To take all measures necessary during the performance of the work to protect the entire project area and adjacent properties which would be affected by this work from storm damage, flood hazard, caving of trenches and embankments, and sloughing of material, until final acceptance by the Respondents or their Agent.**
- 3. To maintain completed areas until the entire project area is in satisfactory compliance with these Specifications.**

C. Utility lines, structures and other features indicated on the Drawings which are to remain in service shall be protected by the Contractor from any damage as a result of his operations.

- 1. The Contractor is responsible for the safety and support of structures, utilities and other features on the property and is liable for any movement or settlement of such, and for any damage or injury caused thereby. If at any time the safety of structures, utilities or other features appears to be endangered, the Contractor shall cease operations, shall take precautions to support such, and shall notify the Respondents or their Agent. If the Respondents or their Agent orders additional bracing or shoring to safeguard structures or to prevent movement or settlement, the Contractor shall install it. If the Contractor fails to comply promptly with such an order, the bracing and shoring may be installed by others at the Contractor's expense.**
- 2. Where utility lines or structures not shown on the Drawings are encountered, the Contractor shall report them to the Respondents or their Agent before proceeding with the work.**
- 3. Unless their excavation is necessary to allow work to proceed or as a result of contamination, the Contractor shall bear the cost of repair or replacement of any marked utility lines or structures which are broken or damaged by his operations.**
- 4. All repair work, including backfilling, shall be done as required by these Specifications or the governing utility or agency, whichever is more stringent. The Contractor shall contact the utility or agency and determine the proper requirements for the work.**

3.2 Undermining and Backfill

A. Shoring and Bracing

1. The Contractor shall undermine and support areas as indicated, or as required to remove contaminated soils and materials to the horizontal and vertical limits shown on the Drawings.
2. Where undermining is required, and shoring and bracing system details are not indicated on the Drawings, the Contractor shall obtain the services of a qualified Professional Engineer, licensed in Illinois and competent in soils work, to design and oversee the construction of such shoring and bracing.

B. General Undermining Requirements

1. Shoring and bracing members shall be installed as the work progresses, and shall bear on undisturbed and, if possible, uncontaminated soils. As necessary, shoring and bracing shall be reconstructed or additional shoring and bracing shall be placed to allow the excavation of contaminated soils.
2. Upon completion of contamination excavation, backfill the void with the materials required by the Drawings or these Specifications. Backfill shall be placed so the voids are completely filled and to provide full and necessary support to all structures, utilities, facilities or other features.
3. Install anchor or lag bolts on the underside of undermined walls. Walls shall be straightened and plumbed before final placing of flowable fill and construction of support footings. All such work shall be done under the direction of a qualified Professional Engineer, licensed in Illinois, and competent in such work.

C. Placement of Flowable Fill

1. Flowable fill shall be used to backfill undermining excavations and within a three foot radius of underground utilities. The Contractor may request to substitute flowable fill for backfill of undermined areas where low slump concrete is specified. Prior written approval from the Respondents or their Agent is required for this substitution.
2. Flowable fill shall be discharged from the mixer directly into the areas to be filled. Placement shall continue until fill is to the proper line, grade and elevation.
 - a. Flowable fill shall be placed to above the bottom of the undermined feature.

- b. Excess flowable fill shall be removed after initial set, when necessary to fully penetrate deep or irregular undermining excavations.
 - c. Each placement shall be as continuous as possible.
- 3. Provide formwork or other barriers as necessary to contain the flowable fill to specified placement areas.
- 4. Flowable fill shall be consolidated to eliminate voids and air pockets by tapping the formwork, rodding, spading, or other manual methods. Do not vibrate.
- 5. Surfaces to receive flowable fill shall be prepared as follows.
 - a. All vegetable matter and coarse material which might prevent compaction shall be removed by the Contractor from the surface upon which the fill is to be placed. Any loose and porous soils shall be removed or compacted to a depth specified by the Respondents or their Agent. The surface shall then be plowed or scarified until the surface is free from uneven features that would tend to prevent uniform compaction by the equipment to be used.
 - b. Where fills are constructed on hillsides or slopes, the slope of the original ground on which the fill is to be placed shall be stepped or keyed by the Contractor. The steps shall extend completely through the soil mantle, if any, and into the underlying formation materials.
 - c. Fill shall not be placed on ground which has frozen, unless the ground can be worked (e.g., scarified and recompacted) to remove the frost.
- 6. The Contractor shall not commence backfilling until a radiological survey of the excavation has been completed which verifies all contaminated materials have been removed as required by these Specifications, and the Respondents or their Agent has provided the Contractor with written authorization to begin backfilling.

END OF SECTION 02220

Section 02840 Site Utilities

PART 1 - GENERAL

1.1 Scope

- A. This section describes the general requirements for locating, protecting, removing and installing site utilities.
- B. The known locations of utilities will be shown in the Work Order.
 - 1. Excavation to or below the locations of known utilities is expected as part of the work for the Site.
 - 2. Utility lines and structures indicated in the Work Order which are to remain in service shall be protected by the Contractor from any damage as a result of his operations.
 - 3. All repair work, including backfilling, shall be done as required by the governing utility or agency. The Contractor shall contact the governing utility or agency and determine the requirements for properly completing the work.

1.2 Related Work

- A. Division 1 Sections of these Specifications
- B. Section 02010 - Demolition and Debris Removal
- C. Section 02200 - Contaminated Material Loadout and Earthwork
- D. Section 02220 - Undermining Existing Features

1.3 Health and Safety

- A. Detailed discussions of the potential hazards and the requirements for minimizing the potential for harm to project and offsite personnel, and to the environment, are provided in Section 01020 of these Specifications and the HASP.
- B. All work shall be done under the supervision of personnel experienced and qualified for the work.

- C. All work will be done as required by OSHA regulations published in 29 CFR 1910 and 1926. These regulations are included by reference in these Specifications.
- D. Sampling and analyses of soils from the Site indicate levels of radioactivity in the soils above background levels. Based on the sampling and surveys, the work can proceed under Level D personal protection conditions (see HASP). Air and soil monitoring and sampling will be done during the work to determine if modifications to Level D work conditions are necessary (see Section 01020). Complete descriptions of health and safety requirements for this Site are provided in Section 01020 of these Specifications and the HASP.
 - 1. The Contractor shall be prepared to discontinue work in an area and begin work in an alternate area if monitoring and sampling indicate changes in the work conditions may be necessary and if so directed by the Respondents or their Agent.
 - 2. The Contractor shall be prepared to begin working under changed conditions (greater than or equal to Level D personal protection with appropriate personal equipment and vehicle decontamination) with minimal delay. The requirements which may be necessary if asphalt, concrete, wood, metal or other construction materials containing hazardous materials or levels of radiation above background are encountered are discussed in Section 01020 of these Specifications.
- E. The Field Team Leader or Health and Safety Coordinator may bar any person from the Site who, in their opinion, shows a disregard for health and safety requirements.

1.4 Environmental Safeguards and Regulations

The Contractor shall comply with all federal, State, and local regulations, and the requirements of these Specifications at all times to prevent pollution of air, water and soil. Detailed requirements for the protection of the environment are provided in Section 01020 and the HASP.

1.5 Permits

- A. The Contractor shall be responsible for obtaining all permits required for the work and additions described in this section of these Specifications.
- B. Copies of all the necessary permits shall be provided to the Respondents or their Agent and to the Offsites Manager prior to beginning the work.
- C. At a minimum, all work shall be done in accordance with the requirements of the permits. The requirements of these permits are included by reference in these

Specifications. Where the requirements of the permits and these Specifications are in conflict, the more stringent requirements shall apply.

1.6 Quality Assurance

- A. The Respondents will provide soil testing services. The Respondents will take soil samples and perform moisture-density, gradation, and other tests to ascertain the completed work is in compliance with these Specifications. Samples of the soil may be taken at the place of excavation, stockpiles, or from the fill itself. The testing consultant shall conduct density and other tests on the fill as required by these Specifications. The Contractor shall render assistance as necessary to enable sampling and testing.
- B. The Field Team Leader shall be a person qualified and experienced in the work described in these Specifications.
- C. All work shall be done according to the requirements of these Specifications.

1.7 Submittals. All submittals shall be made to the Respondents or their Agent.

PART 2 - PRODUCTS

2.1 Backfill Materials

- A. General. Fill materials shall be obtained from suitable stockpiles or borrow as defined in these Specifications. Materials containing organic (except topsoil), perishable, spongy, frozen, expansive or other deleterious materials shall not be acceptable.
- B. Embedment. Embedment material shall be fine aggregate or sand as defined by Part 2 of Section 02200 of these Specifications.

2.2 Utilities

Materials used to reconstruct utilities shall be as required by the utility company, the governing municipal agency, or the building code.

PART 3 - EXECUTION

3.1 Location

- A. The known locations of utilities shall be included in the Work Order for the Site. The Contractor shall be responsible for field verifying utility locations and for obtaining any necessary additional information to properly prepare the Work Order.

1. Known and suspected utilities are shown in the Work Order. The locations shown may prove to be inaccurate and other obstructions not shown may be encountered. Any reliance on this information will be at the Contractor's risk. The Contractor shall arrange to have all utilities located by the utility companies or a utility location service prior to beginning work (e.g., DIGGER).
 2. Excavations in the areas of suspected underground utilities shall be done with care, using equipment such as small, rubber-tired backhoe/loaders. When within one foot of the expected vertical and horizontal location of the utility, excavation will be done manually until the exact location of the utility is determined.
- B. Utility lines and structures which are to remain in service shall be protected by the Contractor from any damage as a result of his operations.
1. Where utility lines or structures not shown in the Work Order are encountered, the Contractor shall report them to the Respondents or their Agent before proceeding with the work.
 2. Unless their excavation is necessary to allow work to proceed or as a result of contamination, the Contractor shall bear the cost of repair or replacement of any marked utility lines or structures which are broken or damaged by his operations.
 3. All repair work, including backfilling, shall be done as required by the governing utility or agency. The Contractor shall contact the governing utility or agency and determine the requirements for properly completing the work.

3.2 Existing Utilities Designated for Excavation

- A. Overhead Utilities shall be removed and replaced by the utility if such is necessary for proper completion of the work. If the utility will or cannot remove them, procedures for excavation will be discussed with and approved by the utility. At a minimum, removal of overhead utilities shall include the following.
1. Obtain the necessary disconnects and verify the utilities are de-energized and grounded prior to the work.
 2. Remove cables and guy-wires from the utility poles.
 3. Determine if the above- and below-grade sections of the poles are contaminated with radiological materials.
 - a. If the above-grade sections are not contaminated and the lower section is, or if the potential for contamination of the below-grade section is

unknown, fell above-grade sections of utility poles by sawing or other suitable methods to separate the uncontaminated above-grade sections from the potentially contaminated below-ground section.

- b. If both sections are contaminated, the pole may be removed by felling the above-grade part and excavating the below-grade part, or by pulling the pole from the ground with a crane or other equipment.
4. Uncontaminated components of overhead utilities, such as cables, guy-wires, etc., shall be disposed as required by Section 02010 of these Specifications.
5. Contaminated components of overhead utilities shall be removed and processed for loadout and disposal as other contaminated debris (see Section 02010 of these Specifications).
6. Excavated materials shall be handled as required by Subparts 3.5, 3.6, 3.8 and 3.9 of Section 02010 of these Specifications.

B. Underground Utilities

1. Underground Utilities to be removed may be removed by the utility. At a minimum, the following procedures shall be used.
 - a. Obtain the necessary disconnects or shutoffs prior to the work and verify the utility is de-energized, drained, or purged as necessary (lock-out and tag-out procedures properly implemented).
 - b. Excavate and manage materials to access contaminated utilities or bedding materials as required in Subparts 3.5, 3.6, 3.8 and 3.9 of Section 02010 of these Specifications.
 - c. Remove, decontaminate and dispose of contaminated utility materials as required in subparts 3.5, 3.6, 3.8 and 3.9 of Section 02010 of these Specifications.
 - d. Replace, repair, or abandon the removed utility as directed by these Specifications and the Work Order, or the utility company or municipal agency having jurisdiction.
 - (1) Replacement or repairs of the utilities shall be in accordance with the requirements of these Specifications or the utility or agency.
 - (2) Abandoned utilities shall be capped as required by Article 3.3 of this section.

3.3 Underground Utilities Encountered During Excavation

- A. Damage to utilities shall be repaired under the supervision of the respective utility service or municipal agency having jurisdiction.**
- B. Abandoned utilities shall be cleaned of all encrusted contamination. Open ends or broken pipes shall be properly capped.**
 - 1. At a minimum, capping may be done by crimping, pouring concrete around, or plugging the open end in such a way as to prevent a "least path of resistance" for any future gas leaks.**
 - 2. Capping will be done as required by the utility or municipal agency if their requirements exceed those above.**
- C. Active utilities shall be supported in-place, if suitable, or removed and replaced as necessary to excavate to the depths shown in the Work Order.**
 - 1. Support or removal and replacement shall comply with the more stringent requirements of the affected utility or municipal agency or these Specifications (see this section and Section 02220 of these Specifications).**
 - 2. Utility lines, whether removed or left in-place, shall be cleaned of encrusted contamination as required and described by Section 02010 of these Specifications.**
 - 3. Removed utilities shall be managed and disposed as required in Section 02010 for other demolition debris.**

3.4 Underground Utility Installations

- A. The Contractor shall coordinate interruptions of utility services through the Respondents or their Agent.**
- B. If utilities are installed after backfilling is complete, all excavations shall be by open cut.**
 - 1. The banks of the trenches should be as vertical as possible. Shoring and bracing, as necessary shall be designed by a qualified Professional Engineer competent in soils engineering. The design of shoring and bracing shall be provided to the Respondents or their Agent.**
 - 2. If rock is encountered, the base of the trench will be overexcavated at least six inches to allow for placement of bedding material.**
- C. If utilities are installed before backfilling is completed to final line, elevation and grade, the fill shall be to at least 12 inches above the top of the utility before excavation and placement of the utility is begun.**

- D. Trench Preparation. The bottom of the trench shall be accurately excavated to line, and graded and shaped to fit the lower one-quarter of the pipe to provide uniform bearing and support for each section; wedging and blocking will not be permitted. If the pipe has bell ends, the trench shall be overexcavated at the joints. If the common fill is granular, the base of the trench shall be scarified to a depth of six inches and recompactd to at least 95% of maximum density at $\pm 2\%$ of optimum moisture (standard proctor, ASTM D698). If the common backfill is not granular in nature, the base of the trench shall be overexcavated six inches and backfilled with granular (embedment) material compacted to at least 95% of maximum density at $\pm 2\%$ of optimum moisture.
- E. Utility Embedment. All utility lines except electric lines and irrigation lines two inches or less in diameter shall be embedded in fine aggregate (see Subpart 2.1.B of this section).
1. Embedment material shall extend a distance equivalent to the utility diameter above, below and to the sides of the utility for utilities greater than six inches in diameter. A six-inch embedment shall be provided for utilities less than or equal to six inches in diameter.
 2. Care shall be taken not to disturb either the horizontal or vertical alignment of the utility; embed both sides of the utility simultaneously. If necessary, compact embedment material by hand to avoid displacement and damage to the utility.
- F. All utility installations shall be inspected by the Respondents, and by the utility or municipal agency if necessary, at the following times.
1. Before placing embedment material over the utility.
 2. Before placing common fill over the embedment material.
- G. Compaction of common material over the utility shall be by manually-operated power equipment or by hand until at least 12 inches of fill has been placed over the utility. Damage to the utility by compaction or other causes after proper installation shall be the responsibility of the Contractor.
- H. Tests. Testing shall be done on all repaired or replaced systems. Testing may be done by the utility or municipal agency or Contractor. All testing will be done as required by the utility, municipal agency or applicable building code. All testing will be done in the presence of the Respondents, and utility, municipal agency or building inspectors, as necessary.

END OF SECTION 02840

Section 03300 Cast-In-Place Concrete

PART 1 - GENERAL

1.1 Scope

This section describes the requirements for concrete construction including materials, formwork, reinforcing steel, installation of embedded items, concrete placement, and finishing.

1.2 Field Reference Manual

At least one copy of "Specifications for Structural Concrete for Buildings (ACI 301) with Selected ACI and ASTM References," SP-15 should be kept at the Site for reference purposes.

1.3 Applicable Publications. The publications listed below form a part of these Specifications to the extent referenced. The publications are referred to in the text by the basic designation only:

A. American Concrete Institute (ACI)

ACI 301 Specification for Structural Concrete for Buildings

ACI 318 Building Code Requirement for Reinforced Concrete

B. American Society for Testing Materials (ASTM)

A 185 Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement

A 615 Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement

C 94 Specification for Ready-Mixed Concrete

C 150 Specification for Portland Cement

D 994 Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type)

1.4 Related Work

A. Division 1 Sections of these Specifications

B. Section 02010 - Demolition and Debris Removal

C. Section 02200 - Contaminated Material Loadout and Earthwork

D. Section 02220 - Undermining Existing Features

1.5 Health and Safety

- A. Detailed discussions of the potential hazards and the requirements for minimizing the potential for harm to project and offsite personnel, and to the environment, are provided in Section 01020 of these Specifications.
- B. Care shall be given to following manufacturers' recommendations concerning the use of additives or agents to concrete, in particular the use of chemical protective equipment when working with these materials.
- C. All work shall be done under the supervision of experienced personnel.
- D. All work will be done as required by OSHA regulations published in 29 CFR 1926. These regulations are included by reference in these Specifications.
- E. The Field Team Leader or Health and Safety Coordinator may bar any person from the Site who, in their opinion, shows a disregard for health and safety requirements.

1.6 Submittals

- A. Comply with pertinent provisions of Section 01340 of these Specifications. All submittals shall be made to the Respondents or their authorized Agent.
- B. Mix Designs - Prior to installation, concrete mix designs and supporting certified test reports shall be submitted for the concrete mix to be used.
- C. Delivery Tickets - Concrete delivery tickets shall be submitted at the time of the concrete placement. Delivery tickets should contain the following information and shall be identified with the structure and property in which the concrete is placed.
 - date,
 - time of loadout,
 - time arrived onsite,
 - time leaving site.
 - design,
 - quantity in cubic yards,

- address of supplier, and
- truck number.

D. Concrete Strength Test Reports - Submit concrete strength test reports to the Respondents or their Agent within 24 hours of the test. Final test results shall be submitted within seven days of the test. The requirements of ACI 301 should be used for test result reporting.

PART 2 - PRODUCTS

2.1 Materials

A. Materials shall meet the requirements of ACI 301 and the following supplemental requirements:

1. Portland Cement: ASTM C 150, Type I or Type II.
2. Air Entrainment: Concrete shall be air entrained and shall have a total air content of 6 plus or minus 2 percent.
3. Aggregates: Maximum size shall be three-quarter inch.
4. Reinforcing Steel:
 Steel Bars - ASTM A 615, deformed Grade 40.
 Welded Wire Fabric - ASTM A 185, gage and mesh size as noted in the Work Order.
5. Joint Materials: Bituminous Type conforming to ASTM D 944.
6. Concrete Sealer: Where "seal" is scheduled for floor slabs to remain exposed, use Master Builders "Masterseal," Sonneborn's "Kure-N-Seal," or an equal concrete curing and sealing compound.

2.2 Concrete Mixes

- A. Provide a mix design based on strengths of the approved materials and meeting the requirements stated in this Specification and in the Work Order.
- B. Concrete Strengths and Slump. *All concrete work will be performed using 4000 psi concrete with a four inch maximum slump. This type of concrete meets City of Chicago building codes, is readily available, finishes well, and is appropriate for this work.*

PART 3 - EXECUTION

3.1 General Requirements

- A. For new work, concrete construction shall conform to all requirements of ACI 301 except as modified by the following supplemental requirements:
1. **Splices:** Splices of reinforcement shall meet the requirements of ACI 318, Section 12. Welding of reinforcing bars (rebar) is not permitted.
 2. **Concrete Finishes and Tolerances:**
 - a. **Finishes of formed surfaces** shall conform to Section 10.2.1 of ACI 301.
 - b. **Exposed surfaces** shall conform to the following Sections of ACI 301:
 - 1) **Exterior flatwork subject to foot traffic** - Section 11.7.4
 - 2) **All other applications** - Section 11.7.3
 3. **Appearance:** For purposes of acceptance, all exposed concrete surfaces shall be considered as "Exposed to Public View" as defined in ACI 301.
 4. **Curing and Protection:** Where "seal" is scheduled for floor slabs to remain exposed, apply concrete sealer in strict accordance with manufacturer's instructions and recommended application rates.
 5. **Strength tests:**
 - a. Substitute the following paragraph for Article 16.3.4.4 of ACI 301:

Make one strength test, consisting of three specimens, when any concrete mixture design is initially placed on the project and every 40 cubic yards of concrete placed thereafter. Random strength tests may be requested by the Contractor or his designated inspector at their discretion.
 - b. Except as noted above, comply with all other requirements of Chapter 16 - Testing of ACI 301, for strength tests and other testing requirements.
- B. Where necessary or shown on the plans to remove and replace concrete sidewalk, driveways, curb and curb-and-gutter, replacements shall be made as follows:
1. Concrete sidewalks, driveways, curbs and curb-and-gutter shall be replaced with concrete meeting the requirements of 2.2.B of this section.

2. Minimum thickness shall be four inches (4") for sidewalks and six inches (6") for driveways.
3. Sidewalk, driveway, curb or curb-and-gutter dimensions and surfaces shall conform as nearly as possible with the existing installations. One-half inch (½") preformed expansion joints shall be placed at intervals not exceeding twenty feet (20') and at the junctions with existing work or as described in the Work Order.

3.2 Soil Backfill for Concrete

- A. Before beginning backfilling, all foreign material, including water, shall be removed from the space to be backfilled. Sloping sides of the excavated space should be stepped to prevent wedging action of the backfill against the structure.
- B. Backfill shall be placed in uniform layers and to approximately equal heights on opposite sides of structures and walls before compaction. Under slabs, drives, walks, etc., backfill shall be compacted to 95% of maximum density standard proctor (ASTM D698).

3.3 Concrete

- A. Form Work. Forms shall conform to shapes, lines and dimensions as shown or described in the Work Order. Forms may be made of wood or metal, and shall be suitable for supporting and containing the work. Before concrete is placed, all forms shall be carefully cleaned, and all reinforcement securely tied. Any necessary materials and labor for the support of reinforcing, pipes, etc., shall be provided by the Contractor. Forms shall not be disturbed until concrete has hardened sufficiently.

B. Reinforcing

1. Reinforcing bars shall be accurately bent to the shapes and lengths required in these Specifications or shown or described in the Work Order. Do not heat the bars for bending. Reinforcing shall be continuous, splices shall be made as required in Part 3.1 of this section of the Specifications.
2. Before placing reinforcing, and again before concrete is placed, if necessary, clean reinforcement of loose mill scale, oil or other coating that might destroy or reduce bond. Do not allow form coatings, release agents, bond breaker, or curing compound to contact reinforcement.
3. Reinforcing shall be placed as required in these Specifications and as shown or described in the Work Order. A minimum of two inches of coverage (from the reinforcing to the surface of the concrete) shall be maintained.

Accurately place reinforcement and securely tie with wire at points where reinforcements cross. Bend the ends of binding wires inward to maintain required concrete coverage. Securely support reinforcement with proper chairs and supports.

C. Mixing and Placing Concrete

1. Before placing concrete, all debris, water, or ice shall be removed from the places to be occupied by the concrete. Wooden forms shall be thoroughly wetted or oiled. No concrete shall be placed until forms, reinforcing, and preparation have been properly completed.
2. Concrete shall be deposited, as nearly as practicable, in its final position to avoid segregation due to rehandling or flowing. No concrete that has partially hardened, has been contaminated by foreign materials, or is "retempered" shall be used.
3. The finished concrete shall be protected for a period of three days and maintained at a temperature of not less than 40 degrees Fahrenheit (40° F). Precaution must be taken during hot weather to prevent cracks due to thermal contraction. Concrete which has frozen shall be removed and replaced at the Contractor's expense. Newly placed concrete shall be allowed to set undisturbed for a minimum curing time of 24 hours. When concrete is placed against the ground, the ground shall be moistened or other provisions shall be made to prevent the ground from drawing water from the concrete.

END OF SECTION 03300

LINDSAY LIGHT II PROJECT

Health and Safety Plan

Title: Health and Safety Plan

Document Number: 400

Revision Number: 0

Approved By:

Date: July 25, 1996

Replaces: None

HEALTH AND SAFETY PLAN

Lindsay Light II Site

Chicago, Illinois

Submitted to:

U.S. EPA Region V

Office of Superfund

July 25, 1996

J. Daniel White
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Date

David M. Jedlicka
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Date

Stephen L. Wampler
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Date

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EMERGENCY PHONE NUMBERS

IN THE EVENT OF AN EMERGENCY DIAL: 911

AMBULANCE SERVICE	911
FIRE DEPARTMENT	911
EMERGENCY RESCUE SERVICE	911
POLICE DEPARTMENT.....	911
NATIONAL RESPONSE CENTER.....	1-800-424-8802
CHEMTREC.....	1-800-424-9300
POISON CONTROL CENTER	1-800-732-2200
NORTHWESTERN MEMORIAL HOSPITAL.....	(312) 908-2000
ILLINOIS DEPARTMENT OF NUCLEAR SAFETY (IDNS) EMERGENCY NUMBER	(217) 785-0600
OFFSITES MANAGER.....	(708) 293-6332
ILLINOIS EMERGENCY MANAGEMENT.....	(217) 782-7860
U.S. ENVIRONMENTAL PROTECTION AGENCY (U.S. EPA)	(312) 886-3601

*Offsite Mgt
Area Code 512, 708?*

1. SCOPE OF PLAN

The following Health and Safety Plan (HASP) will be utilized and modified as necessary in order to minimize and prevent exposures to hazardous substances and conditions related to all excavation and restoration activities at the Lindsay Light II Site (Site). All personnel assigned to this project will be required to review thoroughly the contents of the HASP and to strictly adhere to the policies and procedures listed herein. This HASP is for use only by the Respondents, Chicago Dock and Canal Trust (CDCT) and Kerr-McGee Chemical Corporation (Kerr-McGee), its designated contractors and consultants, and approved site visitors. U.S. EPA, and other agencies, are not considered visitors and will be required to conform to their own Health and Safety Plans.

2. SAFETY MANAGEMENT

The following safety management structure will be utilized for the implementation, administration, and monitoring of the HASP.

2.1 HEALTH AND SAFETY COORDINATOR

The Health and Safety Coordinator (HSC) shall assume overall responsibility for the HASP. The HSC or designee shall monitor and maintain quality assurance of the HASP until project completion. Principal duties of the HSC include:

- Review project background data,
- Approve all HASP modifications,
- Administer and enforce the HASP,
- Evaluate the adequacy of personal protective equipment (PPE) to be used by Site personnel,
- Conduct required on-site training except tailgate safety meetings that will be conducted by the Field Team Leader,
- Brief visitors on work site conditions, and
- Administer personnel and ambient air monitoring procedures.

The HSC or designee has the authority to stop work in the event conditions develop which pose an unreasonable risk to Site personnel or persons in the vicinity.

3. PERSONNEL RESPONSIBILITIES

The HSC or designee will administer and supervise the HASP at the work site level. He will monitor all operations and will be the primary on-site contact for health and safety issues, and will have full authority to stop operations if conditions are judged to be hazardous to on-site personnel or the public.

The HSC will brief all Site personnel on the contents of the HASP. Personnel will be required to review the HASP, and have the opportunity to ask questions about the planned work or hazards. The Field Team Leader will conduct tailgate safety meetings to familiarize the Site personnel with site conditions, boundaries, and physical hazards. Site personnel will conduct their assigned tasks in accordance with the HASP at all times.

If at any time Site personnel observe unsafe conditions, faulty equipment or other conditions which could jeopardize personnel health and safety, they are required to immediately report their observations to the HSC or Field Team Leader.

4. HAZARD ASSESSMENT

The following represents potential hazards associated with this project.

4.1 PRINCIPAL CONTAMINANTS (KNOWN OR SUSPECTED)

- Thorium
- Uranium
- Radium
- Radon

The contaminants are present in the soil at low concentrations. These primary routes of entry to the body will be considered:

<u>ROUTE</u>	<u>ENTRY MADE VIA:</u>
Inhalation:	Airborne dust containing heavy metal radionuclides.
Ingestion:	Airborne dust containing heavy metal radionuclides/contaminants. Improper or poor personal hygiene practices.
Eye and Skin:	Direct contact with contaminants. Improper or poor personal hygiene practices. Airborne dust containing heavy metal/radionuclide contaminant. Cuts and abrasions.
Direct Exposure:	Penetrating gamma radiation in air and soil.

4.2 PHYSICAL HAZARDS

Before field activities begin, the HSC will conduct a Site reconnaissance to identify any real or potential hazards created from Site activities. Physical hazards inherent to construction activities and power-operated equipment may exist.

4.2.1 Heat Stress

Field activities in hot weather create a potential for heat stress. The warning symptoms of heat stress include fatigue; loss of strength; reduced accuracy, comprehension and retention; and reduced alertness and mental capacity. To prevent heat stress, personnel shall receive adequate water supplies and electrolyte replacement fluids, and maintain scheduled work/rest periods.

The Field Team Leader or designee shall continuously visually monitor personnel to note for signs of heat stress. In addition, field personnel will be instructed to observe for symptoms of heat stress and methods on how to control it. One or more of the following control measures can be used to help control heat stress.

- Provision of adequate liquids to replace lost body fluids. Employees must replace body fluids lost from sweating. Employees must be encouraged to drink more than the amount required to satisfy thirst, 12 to 16 ounces every half hour is recommended. Thirst satisfaction is not an accurate indicator of adequate salt and fluid replacement. Replacement fluids can be commercial mixes such as Gatorade.
- Establishment of a work regimen that will provide adequate rest periods for cooling down. This may require additional shifts of workers.
- Breaks should be taken in a cool and shaded rest area (77 degrees is best).
- Employees shall remove impermeable protective garments during rest periods.
- Employees shall not be assigned other tasks during rest periods.
- All employees shall be informed of the importance of adequate rest, acclimation, and proper diet in the prevention of heat stress.

4.2.2 Cold Stress

Field activities are not anticipated during cold weather; however, if the field activities occur during a period when temperatures average below freezing, the following guidelines will be followed.

Persons working outdoors in temperatures of 40 degrees and below may suffer from cold exposure. During prolonged outdoor periods with inadequate clothing, effects of cold exposure may even occur at temperatures well above freezing. Cold exposure may cause severe injury by freezing exposed body surfaces (frostbite) or result in profound generalized cooling, possibly causing death. Areas of the body which have

high surface area-to-volume ratios such as fingers, toes and ears are the most susceptible to frostbite.

Two factors influence the development of a cold injury: ambient temperature and the velocity of the wind. Wind chill is used to describe the chilling effect of moving air in combination with low temperature. For instance, 10° F with a wind of 15 miles per hour (mph) is equivalent in chilling effect to still air at -18°F.

As a general rule, the greatest incremental increase in wind chill occurs when a wind of 5 mph increases to 10 mph. Additionally, water conducts heat 240 times faster than air. Thus, the body cools suddenly when external chemical-protective equipment is removed if the clothing underneath is perspiration-soaked.

Local injury resulting from cold is included in the generic term "frostbite". There are several degrees of damage. Frostbite of the extremities can be categorized into:

- Frost nip or incipient frostbite: Characterized by sudden blanching or whitening of skin.
- Superficial frostbite: Skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient.
- Deep frostbite: Tissues are cold, pale, and solid; extremely serious injury.

Prevention of frostbite is vital. Keep the extremities warm. Wear insulated clothing as part of one's protective gear during extremely cold conditions. Check for symptoms of frostbite at every break. The onset is painless and gradual—you might not know you have been injured until it is too late.

To administer first aid for frostbite, bring the victim indoors and rewarm the areas quickly in water 95° to 100°F. Give individual a warm drink—not coffee, tea, or alcohol. The victim should not smoke. Keep the frozen parts in warm water or covered with warm clothes for 30 minutes, even though the tissue will be very painful as it thaws; then elevate the injured area and protect it from injury. Do not allow blisters to be broken. Use sterile, soft, dry material to cover the injured areas. Keep victim warm and get immediate medical care.

4.2.3 Electrical Hazards

Overhead power lines, downed electrical wires, buried cables and improper use of electrical extension cords can pose a danger of shock or electrocution. All Site personnel should immediately report to the Field Team Leader any condition that could result in a potential electrical hazard.

The Field Team Leader will notify Site personnel during the safety meetings of the locations of known underground cables and utilities.

4.2.4 Noise Hazard

Operation of equipment may present a noise hazard to workers. Site personnel will utilize hearing protection when noise levels are determined to be in excess of 29 CFR 1910.95 requirements. Noise monitoring will be performed to determine noise levels.

4.2.5 Overt Chemical Exposure

Typical response procedures include:

SKIN CONTACT: Use copious amounts of soap and water. Wash/rinse affected area thoroughly, then provide appropriate medical attention. Eye wash will be provided on-site at the work zone and support zone as appropriate. If affected, eyes should be continuously flushed for a minimum of 15 minutes.

INHALATION: Move to fresh air and transport to hospital. Decontaminate as other actions permit.

INGESTION: Transport to emergency medical facility. Decontaminate as permitted by other requirements.

PUNCTURE WOUND

OR LACERATIONS: Transport to emergency medical facility. Field Team Leader will provide Material Safety Data Sheets (MSDS) to medical personnel as requested. Decontaminate as permitted by other requirements.

4.2.6 Adverse Weather Conditions

In the event of adverse weather conditions, the Field Team Leader will determine if work can continue without endangering the health and safety of field workers. Some items to be considered before determining if work should continue are:

- Potential for heat stress and heat-related injuries.
- Potential for cold stress and cold-related injuries.
- Treacherous weather-related working conditions.
- Limited visibility.
- Potential for electrical storms or high winds.

4.3 MEDICAL EVALUATION AND SURVEILLANCE PROGRAM

All field project personnel shall receive a medical evaluation in accordance with 29 CFR 1910.120 and Appendix A. Personnel who receive a medical evaluation will be notified by the medical contractor as to the outcome of their evaluation. This will be in the form of a confidential report addressed to the individual and will contain a breakdown of the clinical findings. In addition, it will indicate any areas of concern which would justify further medical consultation by the individual's personal physician. In the event that the areas of concern are of a severe nature, a follow-up notification will be made to the individual by the medical consultant to answer any questions the employee may have.

4.3.1 Dosimetry/Personnel Monitoring

All project personnel shall participate in a dosimetry program administered by the Project Health Physics Personnel. (The dosimetry program shall comply with 32 IAC 340, i.e. dosimeters shall be processed by a dosimetry processor accredited by the National Voluntary Laboratory Accreditation Program.) The Project Health Physics Personnel shall maintain records of all radiation exposures incurred by field personnel including all contractors. These records will be maintained in an up-to-date manner to comply with the requirements of 32 IAC 340.4010. The HSC shall review the results of personal exposure monitoring to determine compliance with exposure limit requirements.

4.3.2 Requirement for Dosimetry

Personal dosimetry is required for anyone who enters a radiologically controlled area in which he/she may receive in one calendar year a dose in excess of 10% of the limits in 32 IAC 340. Any person who works in a radiation area will be required to have a personal dosimeter. As a matter of policy, all individuals shall be required to use a dosimeter (either self-reading type, film badge or Thermoluminescence Detector (TLD)) whenever they enter the Exclusion Zone.

4.3.3 Bioassay

Bioassay is the determination of the types and amounts of radioactive materials which are inside the body. By analyzing the rate of deposition, the rate of excretion, and any other available information regarding placement in the body, internal exposures from radioactive materials can be estimated.

The Respondents will use procedures described in the Kerr-McGee Radiation Manual for bioassay. Determination for bioassay will be made by the Field Team Leader in conjunction with the requirements of the Kerr-McGee Radiation Manual. The following are requirements of bioassay.

Preliminary Bioassay: Bioassay performed before a person starts work in controlled areas is not necessary on a routine basis for the excavation and restoration

activities. Workers who have had previous significant exposure to uranium or thorium daughters may require preliminary bioassay. Requirements for preliminary bioassay are determined on a case-by-case basis by the Project Health Physics Personnel. Evaluation of occupational exposure history as recorded on form KLA.002 (available in the Kerr-McGee Radiation Manual) will be made to determine the need for preliminary bioassay.

Routine Bioassay: Routine bioassay for workers on the excavation and restoration activities will be required infrequently, if at all. The principal nuclides for bioassay purposes are Ra-228 and Th-232.

Airborne materials are the most likely to be taken into the body, and routine bioassay will be determined on a case-by-case basis from the amount of airborne exposure an individual has had. Airborne radioactivity levels will be determined by air samples.

Routine bioassay will be required if an individual works in airborne radioactivity areas such that he or she is exposed to 2080 DAC hours or more in a calendar year as a result of chronic inhalation exposure and/or a series of small acute exposures to airborne thorium. The preferred bioassay method in this case is in-vivo (lung) counting using procedures with a minimum sensitivity of 6 to 8 mg of Th (natural) for persons with a typical chest wall thickness.

DAC hours are calculated using the appropriate Derived Air Concentration listed in Table I, Column I, Appendix A of 32 IAC 340. Exposure to the DAC in air for one hour is equal to one DAC-hour. Exposure to two times the DAC for one-half hour is also one DAC-hour. These figures assume that no respiratory protective equipment is worn by the individual.

Non-Routine Bioassay: Bioassay may be required in unusual or accidental circumstances including accidental ingestion of a quantity of materials, possible injection from being wounded by a highly contaminated object, or accidental inhalation of concentrated materials released by opening a tank or other closed system. Nasal swabs, sputum samples and direct monitoring will help show the need for bioassay. Non-routine bioassay is conducted for unusual acute inhalation exposures exceeding 2080 DAC hours. Fecal analysis is used to verify the exposure severity. Such verification will require follow-up in-vivo examination.

4.3.4 Emergency Medical Treatment

Emergency first aid should be administered on-site as appropriate. The individual should be decontaminated if possible, depending on the severity of the injury, and transported to the nearest medical facility, if needed. Treatment of the injury is of primary concern and decontamination a secondary concern. Levels of radioactive contamination at the Site could be acutely hazardous if decontamination is not undertaken during an emergency situation. The Field Team Leader will complete the

appropriate incident report, if warranted. See Section 4.4, Accident and Incident Reporting.

An emergency first-aid station will be established and will include a first-aid kit for on-site emergency first aid.

Provisions for emergency medical treatment shall be integrated with the following guidelines:

- At least one individual qualified to render first aid and Cardiopulmonary Resuscitation (CPR) will be assigned to each shift.
- Emergency first aid stations in the immediate work vicinity.
- Conspicuously posted phone numbers and procedures for contacting ambulance services, fire department, police, and medical facilities.
- Maps and directions to medical facilities.
- Conspicuously posted evacuation routes and gathering area locations shall be posted around the site.

4.4 ACCIDENT AND INCIDENT REPORTING

All accidents, injuries, or incidents will be reported to the HSC. This accident/incident will be reported as soon as possible to the employee's supervisor. An Accident/Incident Form will be completed by the Field Team Leader, and a copy will be forwarded to the Offsites Project Manager. A copy of the form is shown as Figure 4.1.

Accident/Exposure Investigation Report (Page 1 of 3)

[illegible]

Emergency Light 5a) and Safety Plan 400-0

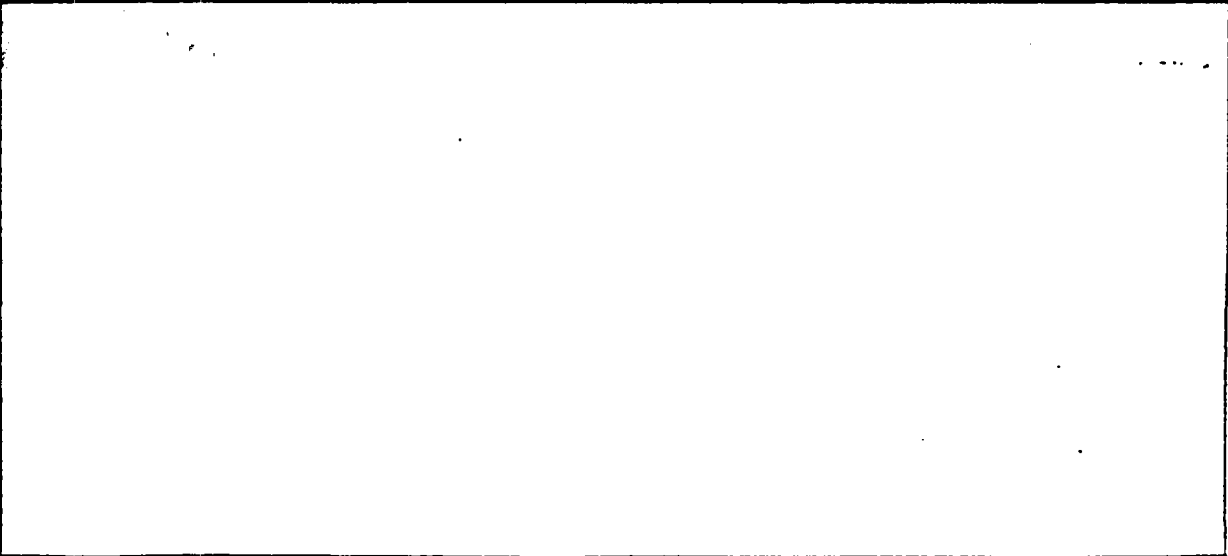
Figure 4.1

Accident/Exposure Investigation Report (Page 2 of 3)

Accident/Exposure Investigation Report			
Accident Description			
Date & Time		Location	
Employees Involved			
Preventive Action Recommendations			
Corrective Actions Completed		Manager Responsible	Date Completed
—Employee Lost Time—Temporary Help—Cleanup—Repair—Discussion—			
Accident Cost Analysis	Investigation	Compliance	Total Cost
Medical			
Production Loss			
Report Prepared By		Date Completed	
Safety Committee Review	Yes	No	
Corrective Action		Date Started	
Safety Communication Notice Prepared		Date	
Safety Director Signature			
Make additional copies of this form as needed. (Form provided courtesy of Safety Publications of California © 1990)			

Figure 4.1

Accident/Exposure Investigation Report (Page 3 of 3)

Accident/Exposure Investigation Report		
Accident Description		
Date & Time	Location	
Employees Involved		
Employee Interview/Statement—Injured Employee—Witness		
Employee Name		
Interviewed By		
Accident Diagram/Photographs		
		

Make additional copies of this form as needed. (form provided courtesy of Safety Publications of California © 1990)

5. TRAINING

All Site personnel shall be trained and certified in accordance with 29 CFR 1910.120 and Kerr-McGee's Medical Evaluation Program (Appendix A). The Kerr-McGee Medical Evaluation Program is an approved and established program that will be used by the Respondents.

5.1 PROJECT- AND SITE-SPECIFIC TRAINING

Prior to project start-up, all assigned personnel shall receive an initial project- and site-specific training session. This training shall include, but not be limited to, the following areas:

- Review of the Health and Safety Plan;
- Review of applicable radiological and physical hazards;
- PPE levels to be used by Site personnel;
- Site security control;
- Emergency response and evacuation procedures;
- Project communication;
- Required decontamination procedures;
- Prohibited on-site activities;
- Instructions to workers in accordance with 10 CFR 1912; and
- U.S. NRC Regulatory Guide 8.13 and Declared Pregnant Woman Policies (Females).

5.2 VISITOR ORIENTATION

All non-essential personnel and visitors who plan to enter the exclusion zone will be briefed on the HASP requirements and 10 CFR 1912 requirements prior to entry with a trained site escort. In addition, female visitors will be instructed regarding U.S. NRC Regulatory Guide 8.13 and Declared Pregnant Woman Policies.

5.3 SAFETY "TAILGATE" MEETINGS

Before the start of work each day, the Field Team Leader will assemble the Site personnel for a brief safety meeting. The purpose of these meetings will be to discuss

project status, problem areas, conditions, safety concerns, PPE levels and to reiterate HASP requirements. The Field Team Leader will complete a Safety Meeting Report (Figure 5.1) to indicate the contents of the meeting and the attendees.

5.4 FIRST AID

At least one (1) individual, trained and qualified to administer first aid and CPR in accordance with American Red Cross requirements, will be present at the Site.

5.5 SAFE WORK PERMIT

Site workers in special work conditions such as confined space, hot work, trenching, or other physical hazards, must be skilled at such work and trained to recognize these as special work conditions. Confined space is defined by OSHA 1910.146. Section 13 of this HASP contains further information on the confined space program to be followed.

Figure 5.2 shows the Safe Work Permit to be completed by the HSC and signed by workers for special work conditions.

Figure 5.1

Safety Meeting Report (KM-4438-A, front side)

SAFETY MEETING REPORT <small>KM-4438-A</small>			DATE
DIVISION	DEPARTMENT/PLANT	LOCATION OF MEETING	
		<input type="checkbox"/> A.M. <input type="checkbox"/> P.M.	<input type="checkbox"/> A.M. <input type="checkbox"/> P.M.
NUMBER PRESENT	NUMBER ABSENT	MEETING CONDUCTED BY	
		WAS MEETING PREVIOUSLY SCHEDULED? <input type="checkbox"/> YES (DESCRIBE BELOW) <input type="checkbox"/> NO	
* SUPERVISOR'S PRESENTATION	DISCUSSION OF SAFETY/SAFE WORK PRACTICES, MATERIALS AND PRECAUTIONS, HAZARDOUS EQUIPMENT / SITUATION, ETC.		
EMPLOYEE FEEDBACK	COMMENTS, QUESTIONS, COMPLAINTS, ETC.		
SUPERVISOR'S CORRECTIVE ACTION PLAN	KNOWN PLANS FOR CORRECTION, PARTS ON ORDER, ITEMS TO BE DISCUSSED WITH DEPT. HEAD, AND CORRECTION OF ITEMS PREVIOUSLY SUBMITTED		
DEPARTMENT HEAD COMMENTS	RESOLUTION OF QUESTIONS, ITEMS OR ISSUES RAISED IN MEETINGS OR WITH SUPERVISOR		
SUPERVISOR	DEPARTMENT HEAD		
FACILITY MANAGER			

Have employees attending sign on reverse side.
Forward a copy to the local Safety Department.

Safety Meeting Report (KM-4438-A, reverse side)

I have received and understand the information and/or training indicated on the reverse side.

[illegible]

LIST ALL EMPLOYEES ABSENT FROM MEETING

This image shows a single sheet of white paper with horizontal black ruling lines. The lines are evenly spaced and run across the width of the page. There is no handwriting or other markings on the paper.

Figure 5.2

Safe Work Permit (KM-2565-1-B, upper section of front side)

SAFE WORK PERMIT

KM-2565-1-B

COMPLETED PERMIT MUST BE POSTED
AT THE ENTRY OR WORK SITE.

SHADED AREAS MUST BE COMPLETED.

PLANT/DEPARTMENT		ISSUED BY		DATE	TIME (FROM)	<input type="checkbox"/> A.M.	(TO)	<input type="checkbox"/> A.M.
ACCEPTED BY				COMPANY/DEPARTMENT/CONTRACTOR				
RESPONSIBILITY TRANSFERRED TO (NAME)				CO-SIGNATURE (IF REQUIRED)				
LIST ALL WORKERS OR ATTACH ROSTER (OVER)				IS WORK AREA OSHA PSM REGULATED? <input type="checkbox"/> Yes <input type="checkbox"/> No				
AN ALERT, GAS RELEASE, EVACUATION, INTERRUPTION OF 8 HOURS OR MORE OR CHANGE IN WORKING CONDITIONS SUSPENDS THIS PERMIT. (Permit must be reissued or reauthorized)								
SECTION 1	GENERAL AREA WORK PERMIT	1. WORK LIMITED TO THE FOLLOWING: (DESCRIPTION & AREA/EQUIPMENT)						
		2. ON-SITE INSPECTION CONDUCTED/ALL LOCKS OR TAGS ATTACHED, IF REQUIRED/ENVIRONMENTAL IMPACT OF JOB CONSIDERED						
		3. SPECIAL HAZARDS TO PROTECT AGAINST <input type="checkbox"/> NONE MSDS AVAILABLE <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A						
		CHEMICALS (NAME)						
		<input type="checkbox"/> Flammable <input type="checkbox"/> Noise <input type="checkbox"/> Hot Water/Steam <input type="checkbox"/> Thermal Burn <input type="checkbox"/> Falls <input type="checkbox"/> Pinch Pts./Srp. Edges <input type="checkbox"/> Electrical _____ volts <input type="checkbox"/> Toxic <input type="checkbox"/> Corrosive <input type="checkbox"/> Heat Stress <input type="checkbox"/> Elect./High Vltg. Line <input type="checkbox"/> Asbestos <input type="checkbox"/> Other _____ <input type="checkbox"/> Hydraulic/Pneumatic _____ psig <input type="checkbox"/> Skin Contact <input type="checkbox"/> Reactive <input type="checkbox"/> High Pressure <input type="checkbox"/> Inert Atmosphere <input type="checkbox"/> Radiation _____ <input type="checkbox"/> Other (magnitude) _____						
		4. SAFETY EQUIPMENT (OTHER THAN AREA REQUIREMENTS) <input type="checkbox"/> NONE						
		<input type="checkbox"/> Rain Suit <input type="checkbox"/> Gloves <input type="checkbox"/> Face Shield <input type="checkbox"/> Ground Fault Circuit Int. <input type="checkbox"/> Air Pack (SCBA) <input type="checkbox"/> Fire Resistant Clothing <input type="checkbox"/> Chemical Suit <input type="checkbox"/> Hearing Protection <input type="checkbox"/> Hood <input type="checkbox"/> Barricade/Warning Signs <input type="checkbox"/> Supplied Air <input type="checkbox"/> Long Sleeves <input type="checkbox"/> Rubber Boots <input type="checkbox"/> Chemical Goggles <input type="checkbox"/> Fall Restraint Device <input type="checkbox"/> Communications Equip. (Sat) <input type="checkbox"/> Respirator <input type="checkbox"/> Other _____						
		5. THE PERSON RECEIVING THE PERMIT VERIFIES THAT ALL WORKERS:						
		A. Have been through the Plant Safety Orientation <input type="checkbox"/> Yes F. Know emergency alarms, evacuation, assembly points <input type="checkbox"/> Yes B. Understand Applicable HAZCOM requirements <input type="checkbox"/> Yes G. Know the Procedures for Safe Job Completion <input type="checkbox"/> Yes C. Have discussed hazards of the job and area <input type="checkbox"/> Yes H. Have inspected all tools/equipment/scaffolding <input type="checkbox"/> Yes D. Know the location/use of safety showers/eye wash stations <input type="checkbox"/> Yes I. Understand the Housekeeping Requirements <input type="checkbox"/> Yes E. Know the location of the phone or intercom <input type="checkbox"/> Yes PERMIT RECEIVER INITIALS _____						
		6. POTENTIALLY AFFECTED AREA PERSONNEL AND WORKERS NOTIFIED OF WORK TO BE DONE <input type="checkbox"/> YES <input type="checkbox"/> N/A						
SECTION 2	AIR TESTS	7. THE FOLLOWING RESPONSIBILITIES HAVE BEEN COMMUNICATED TO THE PERSON RECEIVING THIS PERMIT:						
		<input type="checkbox"/> Conditions For Work Stoppage <input type="checkbox"/> Performing The Work Safely <input type="checkbox"/> Completion Of Section 8 And Permit Return <input type="checkbox"/> Crew Accountability <input type="checkbox"/> Reporting Changes That Affect Job Safety						
		TEST IN ORDER INDICATED						
		1. Oxygen meter <input type="checkbox"/> Yes <input type="checkbox"/> N/A READING _____ RANGE _____ TESTED BY _____ LOCATION OF TEST _____ TIME _____ <input type="checkbox"/> A.M. <input type="checkbox"/> P.M. test performed <input type="checkbox"/> N/A %O ₂ 19.5-23.5% O ₂ MAXIMUM 10% LEL 2. Combustible gases <input type="checkbox"/> Yes <input type="checkbox"/> N/A READING _____ % LEL _____ TESTED BY _____ LOCATION OF TEST _____ TIME _____ <input type="checkbox"/> A.M. <input type="checkbox"/> P.M. and vapors test <input type="checkbox"/> N/A PPM RELTLY PPM PPM TESTED BY _____ LOCATION OF TEST _____ TIME _____ <input type="checkbox"/> A.M. <input type="checkbox"/> P.M. 3. Tests for toxics <input type="checkbox"/> Yes <input type="checkbox"/> N/A READING _____ PPM _____ PPM _____ TESTED BY _____ LOCATION OF TEST _____ TIME _____ <input type="checkbox"/> A.M. <input type="checkbox"/> P.M. (Schedule) <input type="checkbox"/> N/A mg/m ³ mg/m ³ mg/m ³						
SECTION 3	OBSERVATION & RESCUE	PRIOR TO ENTRY OR HOT WORK						
		<input type="checkbox"/> Yes <input type="checkbox"/> N/A Continuous monitoring for _____ SUBSTANCE TESTED BY _____ TIME (FROM) _____ <input type="checkbox"/> A.M. <input type="checkbox"/> P.M. TIME (TO) _____ <input type="checkbox"/> A.M. <input type="checkbox"/> P.M. <input type="checkbox"/> Yes <input type="checkbox"/> N/A Periodic tests for _____ SUBSTANCE TESTED BY _____ TIME (FROM) _____ <input type="checkbox"/> A.M. <input type="checkbox"/> P.M. TIME (TO) _____ <input type="checkbox"/> A.M. <input type="checkbox"/> P.M. <input type="checkbox"/> Duration of work <input type="checkbox"/> Area <input type="checkbox"/> Personal <input type="checkbox"/> Other _____						
		2. Fire/safety/confined space attendants DESIGNATED PERSON(S) _____ HOW TO CONTACT _____						
		3. Backup rescuer(s) DESIGNATED PERSON(S) _____ HOW TO CONTACT _____						
		4. Special rescue service/equipment required LOCATION OF SPECIAL EQUIPMENT _____ RESCUE SERVICE PHONE NUMBER _____						
		DOES NOT APPLY						

Figure 5.2

Safe Work Permit (KM-2565-1-B, lower section of front side)

SECTION 4	HOT WORK	<input type="checkbox"/> DOES NOT APPLY	YES: NO: N/A		YES: NO: N/A	
			1. Fire Extinguisher (Type) _____ is it full?		8. Ground lead attached to work	
			2. Survey area for combustibles and electrical, pipes, branches, etc.		9. Prevention of heat exposure to gasket, seals, liners	
			3. Combustible materials removed or protected		10. Other work in area which should be stopped	
			4. Heat/spark control - tarps, covers, water, etc.		11. Material present which emits vapor when heated	
			5. Precaution taken for hidden combustibles		12. Radiant heat transfer considered	
			6. Purge gas used. Type _____		13. Equipment operating or contains original contents	
			7. Adjacent areas safe-sewers protected		14. Ducts or conveyors cleaned or protected	
SECTION 5	ENERGY LOCKED/TAGGED	<input type="checkbox"/> DOES NOT APPLY	YES: NO: N/A		YES: NO: N/A	
			1. Line positively identified		9. Are all automatic valves secured in a safe position?	
			2. Unintended consequences assessed using process knowledge		10. Electrical panel switches locked, tagged and tested	
			3. Line/equipment cleaned and purged		11. Field switches tested	
			4. Blinds and/or block and bleed in place		12. Fuses removed/switches open	
			5. Locks/tagged (list lockout codes)		13. Are belt/couplings removed?	
			6. Safety guards considered		14. Are rotating parts blocked?	
			7. Adjacent area safe. (If limited, describe below)		COMMENTS	
SECTION 6	CONFINED SPACE	<input type="checkbox"/> DOES NOT APPLY	YES: NO: N/A		YES: NO: N/A	
			1. Confined space entry required?		5. Have authorized entrants signed opposite side of this form?	
			2. Space to be entered _____		6. Have designated attendants signed opposite side of this form?	
			3. Purpose of entry _____		7. Have all necessary hazard control measures been taken?	
SECTION 7	TRENCHING/EXCAVATION	<input type="checkbox"/> DOES NOT APPLY	YES: NO: N/A		YES: NO: N/A	
			1. Has the area been inspected for underground power lines or product lines?		4. Have precautions been taken if the trench/excavation develops into a confined space?	
			2. Does the trench require shoring/bracing support?		5. Have overhead power/product lines been removed or identified?	
			3. Has the soil been evaluated for stability?		6. Will leaving water or rain water affect the stability of the trench/excavation?	
SECTION 8	Questions to be Completed on Permit Expiration or Job Completion	<input type="checkbox"/> DOES NOT APPLY	YES: NO: N/A		YES: NO: N/A	
			1. Has the job been completed?		5. Have safety devices been reinstalled?	
			2. Has the area been cleaned of work materials?		6. Has hot work area been surveyed for smoldering materials?	
			3. Have department personnel been informed job is done?		7. Special precautions, concerns or remarks?	
			COMMENTS			

Safe Work Permit (KM-2565-1-B, reduction of reverse side)

Lindsay Light II, Health and Safety Plan 400-0

6. COMMUNICATIONS

6.1 GENERAL COMMUNICATIONS

The Field Team Leader will have available at the Site the means for telephone communications, or an equivalent means of communication, for summoning emergency assistance from the fire/ambulance and police departments in the event they are required. The telephone will also act as a direct link to technical personnel for information pertaining to all phases of the project.

6.2 RADIOS/TELEPHONES

Short-range walkie talkies or cellular telephones will be made available to designated personnel working at the Site.

6.3 EMERGENCY WARNING

In the event of an emergency condition, the Field Team Leader will notify project personnel verbally if all are within immediate hearing and via a bull horn if the Site area is large. The Field Team Leader will also notify visitors present within the area. Site personnel will immediately proceed to a predesignated assembly area as designated by the Field Team Leader during the daily safety meeting. Personnel will remain in the designated area until further instructions are received by the Field Team Leader.

All communication equipment will be tested at the beginning of each day to verify operational integrity.

6.4 HAND SIGNALS

~~Hand signals~~ will be used by field teams in conjunction with the buddy system. Hand signals shall be familiar to the entire field team before operations commence and should be reviewed during site-specific training.

<u>Signal</u>	<u>Meaning</u>
Hand gripping throat	Out of air; can't breathe
Grip partner's wrist	Leave area immediately; no debate
Hands on top of head	Need assistance
Thumbs up	OK; I'm all right; I understand
Thumbs down	No; negative

6.5 SITE SECURITY

Only authorized personnel will be permitted on the Site in accordance with the requirements of the Site Security Plan (Appendix E to the Work Plan) and this HASP. Visitors and other non-essential personnel may enter the work area only upon authorization by the Field Team Leader. This restricted access will ensure that the Field Team Leader can communicate with each person authorized to enter the work area.

7. PERSONNEL EXPOSURE AND AIR QUALITY MONITORING

7.1 AIR QUALITY (DUST)

Due to the nature of the principal contaminants associated with the project, dust suppression will be important as a means of minimizing exposure levels and off-site migration of contaminants. The Field Team Leader will routinely monitor the project area. The OSHA personal exposure limit (PEL) for nuisance dust is 15 mg/m³.

7.2 AIRBORNE RADIOACTIVITY MONITORING

Monitoring for airborne radioactivity exposure is as important as monitoring for external radiation exposure. Monitoring for airborne radioactivity exposure requires the following elements:

- Air sampling for radioactive particulates,
- Recordkeeping regarding personnel work locations and time in location, and
- Respiratory protective equipment records regarding devices used by workers in airborne radioactivity areas.

By closely monitoring these three elements, a continuous record of personnel exposure to airborne radioactivity is maintained.

Lapel samplers worn for personal air monitoring can be utilized for airborne radioactivity monitoring. Air filters shall be analyzed on a daily basis to determine potential contributions to dose from radionuclides. It is expected that naturally occurring radon and thorium daughters will interfere with analyses. Additional evaluation of samples shall be performed when determined necessary based upon elevated results. Such analyses shall be performed after allowing time for decay of some interfering radionuclides.

Downwind monitoring of the excavation areas for radioactive particulate activity also will be performed. High volume air samplers shall run continuously during operations and be evaluated on a daily basis for gross alpha activity. Comparisons will be made to 32 IAC 340 Appendix A to ensure that adequate radiological controls are in place for workers and the general public. As low as reasonably achievable (ALARA) concepts will be utilized when considering protective measures to ensure that internal exposures are minimized, while also considering the effects of such protective measures with respect to external exposures. Controls on the Site such as wetting of soils and procedural changes, will be employed prior to the prescription of respiratory protective equipment.

Hi-vol 00
160 vol 7
not 10 CFM 20

Time decay of interfering nuclides generally refers to radon-222 decay and daughters but may also include thoron decay. The specific times for decay of samples is best addressed in procedures rather than in the health and safety plan. Air samples will be decayed a minimum of 4 hours to allow for counting without interference from radon-222 and its daughters. Thoron (Rn-220), if present in significant amounts, will require decay for up to 4 days to allow for decay of its Pb-212 daughter (10.6 hour half life).

7.3 INTERNAL MONITORING

Internal monitoring to determine intakes of radioactive material will be performed as needed based upon the results of the air sampling program. Bioassay methods to be considered should include in-vivo, as well as in-vitro, assessments. Routine bioassay of workers is not anticipated based upon the low concentrations of radioactivity in soils to be excavated.

7.4 EXTERNAL RADIATION MONITORING

External radiation monitoring of workers will be performed using film badges or thermoluminescent dosimeters. Dosimetry will be provided and processed by a service holding National Voluntary Laboratory Accreditation Program (NVLAP) certification. Pocket dosimeters may also be utilized for visitors and other infrequent personnel requiring access to the Site.

7.5 RADIOLOGICAL SURVEYS

Radiological surveys will be performed to ensure that radiation levels and contamination levels are within regulatory limits for workers and the general public. Radiation surveys will consist of ambient gamma surveys using micro-R meter or Geiger detectors, as appropriate, and contamination surveys. Airborne radioactivity measurements will be performed as described in the Air Monitoring Plan (Appendix B to the Work Plan).

7.6 CONTAMINATION MONITORING

Samples shall be obtained periodically in work areas to ensure that radioactivity is present at acceptable levels and is prevented from leaving the Site. Decontamination of elevated areas will be performed to maintain contamination at levels that are ALARA.

Before leaving the exclusion zone, Site personnel shall be checked through use of a hand-held frisker to ensure that contamination is not present on skin or clothes. The Field Team Leader will be immediately informed regarding any contamination on individuals and will initiate appropriate decontamination techniques. Proper disposition of contaminated personal effects and clothing also will be the responsibility of the Field Team Leader.

7.7 ACTION LEVELS

Radiological action levels for on-site workers will be determined by smear/swipe measurements as well as airborne particulate monitoring for the presence of radioactivity. The Field Team Leader will perform radiological monitoring. Action levels as determined by radioactive monitoring can be found in Table 7.1.

To avoid the need for upgrade of personal protection equipment due to airborne contamination, engineering controls such as the use of water to minimize dust levels will be implemented as necessary during excavation and restoration activities.

What about fixed
cont on skin?

TABLE 7-1

ACTION LEVELS AS DETERMINED BY RADIOACTIVITY

Note: Personnel shall not be exposed to airborne radioactivity such that their daily intake exceeds 2 Derived Air Concentration (DAC)-hours without prior approval of the Field Team Leader or designee.

Level of protection may be increased to Level C (full-face air purifying respirator) when airborne monitoring indicates that contamination levels have reached 25% of the DAC. All assessments shall incorporate ALARA principles. Engineering controls shall be used prior to assignment of respiratory protective equipment.

Signs shall be posted at entrances to areas where airborne radioactivity levels exceed, or have the potential to exceed, 25% of the DAC.

justify action levels

Radiation Type	Action Level	Level of Respiratory Protection/Action
a. Contamination on smear samples	250 pCi/100 cm ² gross alpha	Consider modified Level C (full- or half-face APR) based upon ALARA evaluation.
b. Airborne Radioactivity	25% DAC	Consider Level C (full-face APR) based upon ALARA evaluation. Ensure proper posting. Consider internal monitoring
c. Ambient Gamma (work areas)	(1)	Consider procedures for shielding of soils. Ensure proper posting.
d. Ambient Gamma (off-site areas)	(1)	Implement immediate controls to reduce dose equivalent rate.

Notes

- (1) The ambient gamma dose equivalent rate action level of 5 mrem/hr stems, from the 10 CFR 20 radiation area definition.

The ambient gamma action level for off-site is based upon the 10 CFR 20 requirements to maintain dose equivalent rates in unrestricted areas such that they do not exceed 0.002 rem in any one hour.

8. PERSONAL PROTECTIVE EQUIPMENT

It is anticipated that most excavation activities can be conducted in Level D personal protective equipment (PPE), with a contingency upgrade to Level C, based on the action levels listed in Section 7. Level C will be used when required by Special Work Permits, or when directed by the Field Team Leader.

Level D personal protective clothing and equipment for excavation activities includes:

- Coveralls,
- Hard hat,
- Chemical resistant, OSHA approved safety shoes/boots,
- Cotton or leather gloves,
- Safety glasses, and
- Dust mask (optional).

Level C protective clothing and equipment includes:

- Full-face air-purifying respirator (NIOSH/MSHA approved) fitted with radionuclides/HEPA cartridges and/or organic vapor cartridges, depending on which action levels are exceeded (see Section 7 of this HASP),
- Coveralls,
- Tyvek coveralls - required in areas when splashing by contaminated soils or water is a possibility,
- Cotton or leather gloves,
- Disposable latex inner gloves - required in areas when splashing by contaminated soils or water is a possibility,
- Nitrile outer gloves (taped) - required in areas when splashing by contaminated soils or water is a possibility,
- Chemical-resistant steel toe boots, and
- Hard hat.

Action levels used to determine the need to upgrade or downgrade the levels of protection are described in Section 7 of this HASP.

Respirator use will be in accordance with the Kerr-McGee Respiratory Protection Program. The Kerr-McGee Respiratory Protection Program is an approved and established program that will be used by the Respondents.

9. CONTAMINATION REDUCTION PROCEDURES

9.1 EQUIPMENT

Portable equipment will be decontaminated with soap and water and rinsed with tap water. Heavy equipment will be steam-cleaned with water and, if necessary, a detergent solution. It is not anticipated that chemical cleaning will be necessary for decontamination.

9.2 PERSONNEL

If levels of radioactivity show that individuals can remove coveralls and other personal protective clothing and equipment before leaving the work site and, thus complete decontamination, the individuals may leave the Site. If, however, levels of radioactivity show that individuals cannot achieve decontamination by the removal of coveralls and showering is required, they will be dressed in clean coveralls, boots and gloves and be transported to the Rare Earths Facility Contamination Reduction Zone to complete decontamination.

If substantial skin contamination occurs on an individual working with radioactive materials, the following specific procedures should be followed to prevent fixation of the material in the skin or absorption of the radioactivity through the skin.

Immediate Action: Notify the HSC or Field Team Leader, who will supervise the decontamination. If contamination is spotty, the HSC or Field Team Leader will supervise the cleaning of the individual spots with swabs, soap, or water. If the contamination is general, the HSC or Field Team Leader may recommend washing the area gently in warm or cool water (not hot) using hand soap (not detergent) for ~~one minute~~. Rinse, dry, and monitor for radioactivity. This soap wash step may be repeated three times.

Evaluation: If the above procedure fails to remove all the skin contamination, the treatment should cease. An evaluation of the skin contamination should be performed by the HSC or Field Team Leader including an estimate of the dose commitment to the skin, and the quantity and identity of the nuclides contaminating the skin. If additional decontamination steps are necessary, they are performed and documented by the HSC. The guidelines for Personnel Decontamination in the Radiological Handbook, HEW 1970, beginning on page 194, can be used as applicable. CAUTION: Do not use chemicals for personnel decontamination until full evaluation of the contamination is made by the HSC or Field Team Leader.

*Rad Health
Handbook*

9.3 CONTAMINATION PREVENTION

Work practices that minimize the spread of contamination will reduce worker exposure and help ensure valid sample results by precluding cross-contamination. Procedures for contamination avoidance include:

- knowing the limitations of all personal protective equipment being used,
- avoiding walking through areas of obvious or known contamination,
- refraining from handling or touching contaminated materials directly. Do not sit or lean on potentially contaminated surfaces,
- ensuring personal protective equipment has no cuts or tears prior to donning,
- fastening all closures on suits, covering with tape if necessary,
- taking steps to protect against any skin injuries,
- staying upwind of airborne contaminants, and
- when working in contaminated areas, refraining from eating, chewing gum, smoking, or engaging in any activity from which contaminated materials may be ingested.

9.4 DISPOSAL PROCEDURES

All discarded materials, waste materials, or other field equipment and supplies should be handled in such a way as to preclude the spread of contamination, creating a sanitary hazard, or causing litter to be left on-site. All potentially contaminated waste materials (e.g., clothing, gloves) shall be monitored and segregated in accordance with monitoring results into either radioactive or non-radioactive waste. Appropriate labels shall be affixed to all containers of radioactive materials.

10. GENERAL WORK PRECAUTIONS

10.1 KERR-MCGEE SAFETY HANDBOOK

The Respondents will adopt the Kerr-McGee Safety Handbook for use at the Site. The handbook is a summary of general work precautions and is included as Appendix C. All personnel who will be present on the Site will be provided a copy the Kerr-McGee Safety Handbook. Receipt of the handbook shall be indicated by signing and submitting the form in the handbook.

10.2 PERSONNEL

In addition to general work precautions which are covered in the Kerr-McGee Safety Handbook, the following general work precautions apply to all Site personnel.

- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited in the work area.
- Hands and face must be thoroughly washed upon leaving the work area. Wash water will be provided at the Site for this purpose.
- Whenever levels of radioactivity warrant, the entire body should be thoroughly washed, as soon as possible, after the protective coveralls and other clothing are removed as part of the decontamination process.
- No facial hair that interferes with a satisfactory fit of the mask-to-face-seal is allowed on personnel required to wear respirators.
- ~~Contact~~ Contact with contaminated or suspected contaminated surfaces should be avoided. Whenever possible, do not walk through puddles, leachate, discolored surfaces, kneel on ground, lean, sit, or place equipment on drums, containers, or the ground.
- Medicine, drugs and alcohol may interfere with or impair judgment and reaction times. Therefore, usage of prescribed drugs must be specifically approved by a qualified physician and made known to the Field Team Leader prior to an individuals' presence on the work site. Alcoholic beverage intake is strictly prohibited at the Site and prior to work in accordance with Kerr-McGee policy.
- All personnel must be familiar with standard operating procedures and any additional instructions and information contained in the HASP.

- All personnel must adhere to the requirements of the HASP.
- Contact lenses are not permitted when respiratory protection is required or where the possibility of a splash exists.
- Personnel must be cognizant of symptoms for radiological exposure on-site, for heat stress and cold stress, and knowledgeable regarding emergency measures contained in the Emergency Contingency Plan.
- Respirators shall be cleaned and disinfected after each day's use or more often, if necessary.
- Prior to donning, respirators shall be inspected for worn or deteriorated parts. Emergency respirators or self-contained devices will be inspected at least once a month and after each use.
- Each employee shall be familiar with Kerr-McGee's Respiratory Protection Program (Appendix B).

10.3 OPERATIONAL PRECAUTIONS

The following operational precautions must be observed at all times.

- All Site personnel shall be adequately trained and thoroughly briefed on anticipated hazards, equipment to be worn, safety practices to be followed, emergency procedures, and communications.
- All required respiratory protective devices and clothing shall be worn by all personnel going into areas designated for wearing protective equipment.
- All Site personnel shall use the buddy system when wearing respiratory protective equipment. At a minimum, a third person, suitably equipped as a safety backup, is required during extremely hazardous entries.
- During continual operations, on-site workers act as a safety backup to each other. Off-site personnel provide emergency assistance.
- Personnel should practice any unfamiliar operations prior to undertaking the actual procedure.
- Entrance and exit locations shall be designated and emergency escape routes delineated. Warning signals for Site evacuation must be established.
- Personnel and equipment in the contaminated work area should be minimized, consistent with effective Site operations.

- Work areas for various operational activities shall be established.
- Procedures for leaving a contaminated area shall be planned and implemented prior to going on-site. Work areas and decontamination procedures shall be established based on expected Site conditions.
- Frequent and regular inspection of Site operations will be conducted to ensure compliance with the HASP. If any changes in operation occur, the HASP will be modified to reflect those changes.

11. SANITARY FACILITIES

11.1 POTABLE WATER

- a. An adequate supply of potable drinking water shall be maintained at all times immediately outside the Site. Drinking water shall meet all federal, state and local health requirements.
- b. Drinking water shall be supplied to project personnel via approved dispensing sources.
- c. Paper cups shall be permitted for the drinking of potable water supplies.
- d. Drinking water dispensers shall be clearly marked and shall, in no way, have the potential for contamination from non-potable supplies.
- e. Site personnel must be fully decontaminated prior to approaching the drinking water supply.

11.2 TOILET FACILITIES

- a. Adequate toilet facilities shall be provided at the Site.
- b. These facilities shall be in the form of portable chemical toilets.
- c. Routine servicing and cleaning of the toilets should be established with the selected contractor and shall be in accordance with federal, state, and local health regulations.
- d. Site personnel must be fully decontaminated prior to approaching the toilet facilities.

11.3 WASHING AREAS

- a. Adequate washing areas shall be provided for personal use within the work area.
- b. Washing areas shall be maintained in a sanitary condition and will be provided with adequate supplies of soap, towels for drying, and covered waste receptacles.
- c. Washing areas shall be maintained and sanitized daily.
- d. No eating, drinking or smoking shall be permitted in the work area. This policy will be strictly enforced by the Field Team Leader.

12. FIRE CONTROL EQUIPMENT

An adequate number of approved portable fire extinguishers (class rated A, B and C) shall be readily available at the Site at all times.

All Site personnel shall be trained in the use of the extinguishers. Extinguishers shall only be used on outbreak stage fires or fires of minor nature. The local fire department shall be contacted in the event of a larger fire and Site evacuation procedures should be commenced in accordance with the procedures described in the Emergency Contingency Plan.

13. CONFINED SPACE PROGRAM

13.1 PURPOSE

In the event that confined space work is a necessity, a Confined Space Program will be implemented. Training in the recognition of confined spaces is a component of the health and safety training program.

The purpose of the Confined Space Program is to establish procedures to protect personnel from this serious hazard in the course of their work; and at a minimum, to comply with 29 CFR OSHA 1910.146. This document assigns responsibilities and sets standards for personnel engaged in activities where confined spaces may be present.

13.2 RESPONSIBILITIES

13.2.1 Health and Safety Coordinator

The Health and Safety Coordinator administers the Confined Space Program. The Health and Safety Coordinator's responsibilities include:

- Review of the HASP for potential confined space hazards and design alternative approaches to accomplish the confined space tasks;
- Coordinating and managing the Confined Space Program in the event one is required;
- Establishing priorities for implementation of the program;
- ~~Assisting~~ with recognition and implementation of the Confined Space Program;
- Advising project management on confined space issues; and
- Communicating the Confined Space Program to personnel by training related to specific Site activities.

13.2.2 Offsites Manager

The Offsites Manager directs the application of the Confined Space Program to project work. The Offsites Manager is responsible for:

- Working with the Health and Safety Coordinator to prepare information describing activities that might be conducted in a confined space area;

- Assuring that all personnel engaged in project activities are familiar with the definition of a confined space;
- Assuring that personnel are familiar with the Confined Space Program, and that project activities are conducted in compliance with the Confined Space Program;
- Assuming the responsibilities of the Field Team Leader if another person is not assigned these responsibilities.

13.2.3 Field Team Leader

The Field Team Leader is responsible for the implementation of the Confined Space Program on-site during field activities. The Field Team Leader is responsible for:

- Overseeing implementation of the Confined Space Program during field operations; and
- Reporting confined space work activity, and any violations of the Confined Space Program, to the Offsites Project Manager and the Health and Safety Coordinator.

13.2.4 Personnel

Personnel are responsible for:

- Familiarizing themselves with the Confined Space Program and following it;
- Becoming familiar with the criteria for determining a confined space, and with the monitoring, permitting, and other requirements of the program; and
- Reporting immediately a confined space condition to the Field Team Leader.

13.3 DEFINITION OF A CONFINED SPACE

Confined space means a space that:

1. Is large enough and so configured that an employee can bodily enter and perform assigned work;
2. Has limited or restricted means for entry or exit (such as pits, storage bins, hoppers, crawl spaces, and storm cellar areas); and

3. Is not designed for continuous employee occupancy.

Any workspace meeting all of these criteria is a confined space and the Confined Space Program must be followed.

13.4 CONFINED SPACE ENTRY PROCEDURES

13.4.1 Safety Work Permit Required

All spaces shall be considered permit-required confined spaces until the pre-entry procedures demonstrate otherwise. The Safe Work Permit for entry into a confined space must be completed before work begins; it verifies completion of the items necessary for confined space entry. The Permit will be kept at the Site for the duration of the confined space work. If there is an interruption of work, or the alarm conditions change, a new Permit must be obtained before work begins.

A permit is not required when the space can be maintained for safe entry by 100% fresh air mechanical ventilation. This must be documented and approved by the Health and Safety Coordinator. Mechanical ventilation systems, where applicable, shall be set at 100% fresh air.

The Field Team Leader must certify that all hazards have been eliminated on the Entry Permit. If conditions change, a new permit is required.

13.4.2 Pre-entry Testing for Potential Hazards

a. Surveillance

Personnel first will survey the surrounding area to assure the absence of hazards such as contaminated water, soil, or sediment, barrels, tanks, or piping where vapors may drift into the confined space.

b. Testing

No personnel will enter a confined space if any one of these conditions exists during pre-entry testing. Determinations will be made for the following conditions:

1. Presence of toxic gases or dusts: Equal to or more than 5 parts per million (ppm) on the organic vapor analyzer with an alarm, above background outside the confined space area; or other action levels for specific gases, vapors, or dusts as specified in the Health and Safety Plan and the Confined Space Permit based on knowledge of Site constituents;
2. Presence of explosive/flammable gases: Equal to or greater than 10% of the Lower Explosive Limit (LEL) as measured with a combustible gas indicator or similar instrument (with an alarm); and

3. Oxygen Deficiency: A concentration of oxygen in the atmosphere equal to or less than 19.5% by volume as measured with an oxygen meter.

Pre-entry tests results will be recorded and kept at the Site for the duration of the job by the Field Team Leader. Affected personnel can review the test results.

c. Authorization

Only the Field Team Leader and the Health and Safety Coordinator can authorize any personnel to enter into a confined space. This is reflected on the Safe Work Permit for entry into a confined space. The Field Team Leader must assure that conditions in the confined space meet permit requirements before authorizing entry.

d. Safe Work Permit

An Safe Work permit for confined space entry must be filled out by the Health and Safety Coordinator or Field Team Leader. A copy of the Safe Work Permit is included as Figure 5.2.

e. Attendants

One worker will stand by outside the confined space ready to give assistance in the case of an emergency. Under no circumstances will the standby worker enter the confined space or leave the standby position. There shall be at least one other worker not in the confined space within sight or call of the standby worker.

f. Observation and Communication

Communications between standby worker and entrant(s) shall be maintained at all times. Methods of communication that may be specified in the Safe Work Permit and the HASP may include voice, voice by powered radio, tapping or rapping codes, signaling tugs on rope, and standby worker's observations that activity appears normal.

13.4.3 Rescue Procedures

Acceptable rescue procedures include entry by a team of rescuers only if the appropriate air-purifying respirator is available; or use of public emergency services.

The standby worker must be trained in first aid, CPR and respirator use. A first aid kit should be on hand and ready for emergency use. The standby worker must be trained in rescue procedures.

13.5 TRAINING

Personnel who will engage in field activities will be given annual training on the requirements and responsibilities in the Confined Space Program and on OSHA 1910.146. Only trained personnel can work in confined spaces. Workers should be experienced in the tasks to be performed, instructed in proper use of respirators, lifelines and other equipment, and practice emergency procedures and self-rescue.

Before each Site activity, the determination of confined space work will be part of the Site characterization process. Training in the site-specific confined space activities will be part of the site-specific health and safety training.

13.6 SAFE WORK PRACTICES

- Warning signs should be posted. These include warnings for entry permits, respirator use, prohibition of hot work and emergency procedures and phone numbers.
- Cylinders containing oxygen, acetylene or other fuel such as gasoline must be removed a safe distance from the confined space work area.
- Purging and ventilating is done before work begins to remove hazardous vapors from the space. The space should be monitored to ensure that the gas used to purge the space (e.g. tank) has also been removed. Local exhaust should be used where general exhaust is not practical.
- The buddy system is used at all times. A standby person always must be posted within sight of, or in communication with, the person inside the confined space. The standby should not enter the confined space, but instead will call for help in an emergency and not leave the post. Communication should be maintained at all times with workers inside the confined space.
- Emergency planning in the HASP and an Safe Work Permit must be approved in advance and the proper rescue equipment must be immediately available.

14. ELECTRICAL LOCKOUT/TAGOUT

The Field Team Leader must approve all work in areas requiring lockout/tagout procedures. Specific procedures and permitting requirements will be specified in the HASP, or in a revised HASP based on the need for a worker to work around electrical equipment.

All systems must be locked out and tagged before the work begins. This includes pipes, air lines, electrical equipment and mechanical devices. The equipment must be start tested and approved for use by a worker by the Health and Safety Coordinator or the Field Team Leader by start-testing to make sure the locked-out equipment does not operate.

APPENDIX A
KERR-MCGEE MEDICAL EVALUATION PROGRAM

KERR-McGEE MEDICAL EVALUATION PROGRAM

All Kerr-McGee personnel and contractors performing field work at the Site will be required to have passed a pre-assignment and/or periodic medical examination that is consistent with requirements outlined in 29 CFR 1910.120(f) and 10 CFR 20.103(a). A physician's release for work and medical clearance to wear a respirator will be confirmed by the SM before any employee can begin site activities (see attached Medical Evaluation forms).

Contractors will maintain the medical records for their own employees, but shall provide the SM with written documentation certifying that each employee at the Site has met the requirements of the Medical Surveillance Program. Employees will be informed of their right to access their medical records.

Pre-assignment and periodic examinations are essentially the same in content and will include:

1. An updated medical and occupational history.
2. A screening physical examination.
3. Blood and urine laboratory tests.
4. Chest X-ray.
5. Pulmonary function tests (if indicated).
6. Audiometry.
7. Visual acuity test.

In addition, upon termination all employees who have not had a physical examination within the last six months will be given a physical examination. Kerr-McGee Corporate Policy also requires passing pre-employment drug screening as a condition of employment.

**GUIDELINES FOR THE ROUTINE USE OF
DIAGNOSTIC X-RAY EXAMINATIONS FOR EMPLOYMENT PURPOSES**

1. Prescription of clinically unproductive X-ray examinations should be avoided.
2. Chest X-ray examinations in routine physical examinations should follow the schedule outlined below:

<u>Age of Employee</u>	<u>Frequency of Exam</u>
18-29	Every 3rd year
30-39	Every 2nd year
40+	Annual

3. Prescription of X-ray studies for the purpose of obtaining diagnostic information should be based on clinical evaluation of symptomatic individuals.
4. Routine screening evaluations, without prior clinical evaluation, should not be performed without careful consideration of both benefit and risk.
5. X-ray examinations should only be prescribed by physicians with expertise to evaluate the examinations.
6. The number of standard views should be limited to those necessary to perform the diagnosis for the intended purpose.
7. Prescription of X-ray examinations for pregnant or possibly pregnant women should assure that medical consideration has been given to fetal exposure and that protective measures are taken.
8. The appropriate technique should be used to keep entrance skin exposure for routine chest X-rays to less than 30 mR.



KERR-MCGEE CORPORATION

MEDICAL EVALUATION FOR WEARING RESPIRATORY EQUIPMENT CM-5437

NOTE TO PHYSICIAN: OSHA Safety and Health Standards require that persons should not be assigned to tasks requiring use of respirators unless it has been determined that they are physically able to perform the work while using the respiratory protection equipment. Permanent health and physical conditions are to be determined by the physician. Care should be taken to ensure that a determination has been made that the employee is capable of wearing a respirator for the duration of the work assignment.

EMPLOYEE'S NAME

TYPE OF WORK

PERCENT OF TIME RESPIRATOR WILL BE WORN

RESPIRATOR TYPE(S)

have examined _____ and it is my opinion that this individual ☐ is ☐ is not (Check appropriate box) physically able to wear respiratory protection equipment as required in the performance of assigned work.

PHYSICIAN'S NAME (TYPE OR PRINT)

PHYSICIAN'S SIGNATURE

DATE

NOTATION FOR PHYSICIAN TO WEAR RESPIRATORY EQUIPMENT



JOB-RELATED MEDICAL EXAMINATION

SECTION II: PERSONAL DATA

NAME OF EMPLOYEE _____ SEX _____ MARITAL STATUS _____ SOCIAL SECURITY NUMBER _____

DATE OF BIRTH _____ STATE _____

DATE OF LAST PHYSICAL EXAM _____

REASON FOR EXAM - Check all that apply: ☐ Annual Physical ☐ Return to work (Employee) ☐ Other (Employer)

SECTION III: OCCUPATIONAL DATA

NAME OF PREVIOUS EMPLOYER _____

DATE OF BIRTH _____

DATE OF PREVIOUS OCCUPATIONAL EXAMINATION _____

TYPE OF PREVIOUS OCCUPATIONAL EXAMINATION: ☐ None ☐ Annual Physical ☐ Other (Employee) ☐ Return to work (Employer)

PREVIOUS EMPLOYER (McGraw-Hill with Chemical)	DATE	JOB TITLE	NATURE OF BUSINESS

SECTION III: OCCUPATIONAL HISTORY

YES () NO () Have you ever experienced any of the following conditions or injuries?

1. Impaired vision while on the job? ☐ YES ☐ NO

2. Suffered a hearing impairment? ☐ YES ☐ NO

3. Been so exhausted you could not perform your job properly? ☐ YES ☐ NO

4. Been involved in a chemical spill or release? ☐ YES ☐ NO

5. Do you work more than 8 hours per week? ☐ YES ☐ NO

6. Do you have any previous or current respiratory illness? ☐ YES ☐ NO

7. Have you ever been exposed to:

- ☐ Asbestos
- ☐ Carbon Dioxide
- ☐ Lead
- ☐ Mercury
- ☐ Ethylene Glycol
- ☐ Ethylene Oxide
- ☐ Hydrogen Sulfide
- ☐ Hydrocyanic Acid
- ☐ Hydrochloric Acid
- ☐ Hydrofluoric Acid
- ☐ Nitrogen Dioxide
- ☐ Nitrogen Trifluoride
- ☐ Nitrogen Tetrafluoride
- ☐ Sulfur Dioxide
- ☐ Sulfur Hexafluoride
- ☐ Sulfuric Acid
- ☐ Toluene
- ☐ Xylene
- ☐ Chlorine
- ☐ Phosgene
- ☐ Hydrogen Peroxide
- ☐ Ammonia
- ☐ Cyanide
- ☐ Fluorine
- ☐ Bromine
- ☐ Iodine
- ☐ Chlorine Dioxide
- ☐ Chlorine Monoxide
- ☐ Chlorine Peroxide
- ☐ Chlorine Trioxide
- ☐ Chlorine Tetraoxide
- ☐ Chlorine Pentafluoride
- ☐ Chlorine Hexafluoride
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- ☐ Chlorine Nonafluoride
- ☐ Chlorine Decafluoride
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- ☐ Chlorine Dodecafluoride
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- ☐ Chlorine Tetrafluoromethane
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- ☐ Chlorine Dodecafluorodecane

DO YOU EVER HAVE ANY OF THE FOLLOWING MEDICAL PROBLEMS?

YES	NO	YES	NO
Headaches (Common)		Stomach problems	
Headaches (Mild)		Fainting spells	
Nausea		Seizures	
Chest Pain		High Fever	
Pain		Arthritis	
Respiratory Problem		Emphysema	
Stroke (Heart)		Frequent Lung Infections	
Asthma		Tuberculosis	
High Cholesterol/Hypertension		Angina Pectoris	
Cancer		Heart Attack	
Gout		Other Heart Disease	
Thyroid Disease		High Blood Pressure	
Diabetes		Kidney Disease	
Skin Problems		Frequent Bladder Infections	
Bleeding Tendency		Glaucoma	

SECTION IV:
PERSONAL HISTORY

LIST ALL SURGERIES AND GIVE DATES

LIST ALL MEDICATIONS YOU ARE CURRENTLY TAKING

LIST ALL OTHER ALLERGIES INCLUDE MEDICATIONS

LIST ALL HOSPITALIZATIONS AND GIVE DATES (OTHER THAN SURGERY)

Have you ever had any of the following tests? If yes, give dates of last test.		Have you ever had these tests?	
YES	NO	YES	NO
Chest X-ray		Spinal X-ray	
Kidney X-ray		Typhoid	
Stomach X-ray		Polio (Child)	
Colon X-ray		Tetanus	
Colonoscopy X-ray		Measles	
Electrocardiogram (ECG)		Mumps	
Other X-rays		Have you ever had a blood transfusion?	
Have you ever had a T.L. test?		Yes	No
Have you ever had a routine T.L. test?			

SECTION V:
FAMILY HISTORY

Does the dad of any blood relative (grandfather, aunt, uncle, cousin, etc.) has or has not any of the following?

YES	NO	RELATION	YES	NO	RELATION	YES	NO	RELATION
Stroke			Emphysema			Normal Blood Pressure		
Cancer			Bleeding Tendency			Gout		
High Blood Pressure			Heart Attack			Injury		
Tuberculosis			Stomach Ulcers			Heart Disease		
Diabetes			Kidney Disease			On-the-job Injury		
Liver Disease			Alcoholism			Alcohol Abuse		
Epilepsy			Gout			Drug Abuse		
Migraine			Thyroid Disease			Inherited Blood Disorders		
Asthma			Arthritis					
High Fever			Gout					

* Also completing form re: Medical Director, Lemmon-Gee Corporation
P.O. Box 23261
Oklahoma City, Oklahoma 73125

PHYSICIAN'S COMMENTS

ACCEPTABLE FOR TYPE OF WORK APPLIED FOR	ACCEPTABLE FOR TYPE OF WORK APPLIED FOR WITH RESTRICTIONS INDICATED BELOW	NOT RECOMMENDED FOR TYPE OF WORK APPLIED FOR
<input type="checkbox"/> Limited standing/walking _____ hours per day <input type="checkbox"/> Unable to use footings <input type="checkbox"/> R or <input type="checkbox"/> L <input type="checkbox"/> Limited use of footings <input type="checkbox"/> R or <input type="checkbox"/> L	<input type="checkbox"/> No vision perception <input type="checkbox"/> Limited color discrimination <input type="checkbox"/> Must wear eye protection at all times	<input type="checkbox"/> No hearing <input type="checkbox"/> Limited hearing <input type="checkbox"/> No exposure to excessive noise
<input type="checkbox"/> No exposure to toxic or hazardous dust <input type="checkbox"/> No exposure to respiratory irritants <input type="checkbox"/> No exposure to harmful gas, fumes or vapors	<input type="checkbox"/> No work at heights <input type="checkbox"/> No serious hazards to self or others in event of loss <input type="checkbox"/> No machine equipment operation	<input type="checkbox"/> No exposure to _____ <input type="checkbox"/> _____ <input type="checkbox"/> _____
<input type="checkbox"/> Unable to use handgrip <input type="checkbox"/> R or <input type="checkbox"/> L <input type="checkbox"/> Limited use of handgrip <input type="checkbox"/> R or <input type="checkbox"/> L	<input type="checkbox"/> Limited carrying/pushing/pulling <input type="checkbox"/> Limited stooping/bending	<input type="checkbox"/> No lifting limitations <input type="checkbox"/> Physical effort <input type="checkbox"/> 25 lbs. <input type="checkbox"/> 50 lbs. <input type="checkbox"/> 75 lbs. <input type="checkbox"/> Limited physical exertion
<input type="checkbox"/> Can work any _____ hours per day <input type="checkbox"/> Can work any _____ hours per week	<input type="checkbox"/> Can work any shift except _____ <input type="checkbox"/> Shift rotation? <input type="checkbox"/> Yes <input type="checkbox"/> No	

I declare under penalty of perjury that I have examined this report and all statements contained herein and to the best of my knowledge and belief, they are true and correct and complete.

ATTENDING PHYSICIAN'S NAME AND TITLE

ATTENDING PHYSICIAN'S SIGNATURE

DATE

PHYSICAL REQUIREMENTS AND WORKING CONDITIONS - 15424

NAME (Last, First)

LOCAL EMPLOYER NAME

DATE

JOB TITLE

SUPPLEMENT

BRIEF DESCRIPTION OF JOB REQUIREMENTS

O = Occasionally up to 25% time on job
F = Frequently 25 - 75% time on job
C = Constantly more than 75% time on job

NO O F C
O = Occasionally up to 25% time on job
F = Frequently 25 - 75% time on job
C = Constantly more than 75% time on job

NO O F C

A. PHYSICAL DEMANDS		B. WORKING CONDITIONS	
1. Standing		1. Outside	
2. Walking		2. Outside and Inside	
3. Sitting		3. Heat between 90° - 100°	
4. Lifting: heavy - Max. 55 lbs.		4. Heat over 100°	
5. Lifting: heavy to mod. - Max. 40 lbs.		5. Cold below 55°	
6. Lifting: moderate - Max. 25 lbs.		6. Temperature Changes - Extreme - Frequent	
7. Lifting: light - Max. 10 lbs.		7. Wetness	
8. Carrying Est. Wt.		8. Dry Atmospheric Conditions	
9. Pushing Est. Wt.		9. Confined Spaces	
10. Pulling Est. Wt.		10. Noise	
11. Pushing hand over hand		11. Constant Noise above 85 dec.	
12. Climbing Stairs		12. Intermittent Noise above 85 dec.	
13. Climbing, Use of legs/arms		13. Vibration	
14. Balancing		14. Fumes - Irritant - Toxic (Please Specify)	
15. Stopping		15. Dust - More than nuisance	
16. Kneeling		16. Gases	
17. Repeated Bending		17. Lead	
18. Crawling		18. Silica - Asbestos	
19. Reaching - over/low level		19. Chemicals	
20. Fingers Movement - Repetitive		20. Grease and Oil	
21. Repetitive Twisting or Pressure involving Wrists or Hands			
22. Both Hands Required			
23. Both Legs Required			
24. Ability for Rapid Mental/Muscular Coordination Simultaneously			
25. Oral Communication, Speak Clearly Spanish - English			
26. Hearing - Conversation			
27. Specific Visual Requirements	Near	Far	
28. Depth Perception	Yes	No	
29. Color vision: Distinguish Basic Shades	Yes	No	
30. Color vision: Distinguish Basic Colors	Yes	No	
31. Operation of Crane, Truck or Motor Vehicle	Yes	No	
32. Other			

C. PROTECTIVE EQUIPMENT REQUIRED

1. Respirator	5. Gloves
2. Eye Protection	6. Boots
3. Hearing Protection	7. Body Protection
4. Hard Hat	8. Other

To the attending physician: Please complete the reverse side of this form.

MEDICAL DATA SHEET

Project Name/Location: Kerr-McGee/West Chicago

Employee Name: _____

Home Telephone: _____

Address: _____

Birthdate: _____

Height: _____

Weight: _____

Drug and Other Allergies:

Notable Medical Conditions/Medical Restrictions:

Do you wear contact lenses? _____ Yes _____ No

Are you using any medications? _____ Yes _____ No Please list:

Emergency Contact: _____

Relationship: _____

Address: _____

Phone: _____

Personal Physician: _____

Phone: _____

Address: _____

APPENDIX B
KERR-MCGEE RESPIRATORY PROTECTION PROGRAM

This Appendix Has Been Deleted

*Why has this
been deleted*

APPENDIX C
KERR-MCGEE SAFETY HANDBOOK

Safety Handbook



Safety First

W-4399

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INTRODUCTION

Safety must be the prime consideration for everyone on the job. You will be required to perform every job in a safe manner.

The safety rules in this handbook have been prepared for your protection and are based on common safe practices, applicable regulations and codes, and on accumulated experience in the prevention and investigation of industrial accidents.

You are required to read and follow all safety rules contained in this safety handbook, and all subsequently posted on the work site.

If you do not understand a safety rule in this handbook, consult management. You are responsible to know all of the safety rules applicable to the work being performed. Ignorance of the safety rules cannot be tolerated as an excuse for their violation.

Your full cooperation is solicited to prevent the pain and suffering to yourself and your loved ones resulting from accident and injury. Your personal contribution to the safety effort will determine the ultimate realization of a safe and healthful working environment.

GENERAL SAFETY RULES

1. Employees shall maintain a clean work site.
2. Tripping hazards, protruding nails, oil slicks, scrap materials and other hazardous conditions occurring during the course of the job shall be eliminated as work progresses.
3. Employees shall not attempt to work when ill or in any other unfit condition which may jeopardize the safety of themselves or others. Employees must notify supervision if taking medication which may affect mental or physical alertness, or if they become ill while on company premises or while on duty.
4. Tools, machinery and equipment shall be operated only by employees who fully understand their use, and have been authorized to do so.
5. Employees shall exercise due care to prevent jeopardizing the safety of themselves or others.
6. All posted signs shall be obeyed.
7. Defective tools and equipment shall not be put into service and shall be reported to management. Unsafe tools and equipment shall be taken out of service and properly tagged.
8. All unsafe conditions or practices shall be reported to management immediately.
9. Employees shall examine their work area and equipment for unsafe conditions prior to proceeding with their work assignments.
10. Employees shall report all injuries to their supervisors before the end of the shift on which they occur.
11. Sliding down ropes, cables, and guys, etc., is strictly prohibited.
12. Employees are prohibited from riding on slings, cradles, skips, conveyors, suspended loads, headache balls, or any other conveyance except where such equipment is approved for this purpose.

PERSONAL SAFETY EQUIPMENT

1. Approved hard hats and foot protection are required to be worn in all mine and construction areas except parking lots and general offices.
2. Approved eye protection including face shields and goggles shall be worn when welding, cutting or working with molten metal or when other hazards to the eyes exist such as grinding, chipping, using jackhammers, air chisels, steam cleaning, compressed air for cleaning, while handling hazardous chemicals, or as otherwise directed by management.
3. Approved safety belts and lanyards or lifelines properly secured shall be worn from elevated work positions eight (8) feet or greater in height where no railings or other perimeter protection exists. Employees shall inspect the equipment to insure it is in proper condition before each use.
4. All employees shall wear protective clothing and equipment required by management.
5. Clothing shall be worn to protect against sunburn.
6. Ragged, torn or loose clothing will not be permitted on the job where it may cause an accident.
7. Long hair (hair extending to the shoulder and longer) and facial hair shall be contained when necessary to guard against fire hazards and rotating machinery hazards.
8. Gloves or other hand protection shall be worn or used when required to prevent an injury.
9. Office personnel entering other work areas shall wear the required protective clothing and equipment for that area.
10. Approved hearing protection shall be worn as directed by management or where noise warning signs are posted.

PERSONAL SAFETY EQUIPMENT (Cont'd)

11. Approved respirators offering protection against the specific contaminant shall be worn as directed by management.

12. Where work requires respiratory protection, employees shall limit the growth of facial hair in the seal area of the respirator to maintain the effectiveness of the respirator.

MACHINE GUARDING

1. Gears, sprockets, chains, drives, couplings, flywheels, shafts, saw blades, fan blades and similar exposed moving machine parts which may be contacted by persons, and which may cause injury, shall be adequately guarded. Employees shall immediately report any guard which is missing or damaged to the extent it is ineffective.

2. Guards shall be kept in place on tools and equipment. Machine guards and safety appliances shall not be removed or made inoperative except for the purpose of making repairs.

3. All mobile equipment under repair shall be adequately chocked and blocked against movement.

4. No work shall be performed under equipment or machinery in a raised position until it is securely blocked in place.

5. Repairs or maintenance shall not be performed on machinery until the source of power is off and the machinery is secured and blocked against motion, except where motion is necessary to make adjustments. The "lockout" procedure shall be followed when maintenance or repairs are made.

ELECTRICAL SAFETY

1. Only authorized employees shall perform maintenance or repairs on electrical wiring or equipment.
2. The electrical "lockout" procedure shall be followed. No maintenance or repairs shall be attempted until the lockout is in place to prevent start up, movement or electrical shock.
3. No one will remove lockout tags, locks or multiple locking bars other than those who attached them. Locks shall not be cut off any lockout.
4. All temporary electrical wiring shall be installed and maintained by qualified personnel in accordance with applicable codes.
5. All electrical tools and equipment must be grounded.
6. Electrical tools or equipment shall not be used unless they have been inspected. Damaged or defective electrical tools must be properly tagged and returned immediately to the tool room for repair.
7. Temporary electric cords must be covered or elevated. They must be kept clear of walk-ways and other locations where they may be exposed to damage or create tripping hazards.
8. Equipment and vehicles shall not be driven over any power cable unless the cable has been physically protected from damage.
9. Booms and masts of equipment shall not be operated within 12 feet of an energized overhead high voltage line.

MATERIAL HANDLING & STORAGE

1. Heavy or awkward materials shall be moved with mechanical aid or with additional help to prevent a lifting hazard.
2. Materials and supplies shall be neatly and securely stacked, blocked and limited in height so as to be stable and in no danger of collapsing, sliding or falling over.
3. Heavy items shall be stored on lower shelves and blocked against falling or rolling.
4. Material shall not be permitted to protrude from shelves in such a manner as to create a hazard.
5. Storage of acids or caustics shall be maintained on the lowest available shelf or rack.

HAND & POWER TOOLS. EQUIPMENT

1. Power saws, grinders, and other power tools must have proper guards in place at all times.
2. Power tools shall be hoisted or lowered by a hand line; never by the cord or hose.
3. Hand held power tools shall not be operated unless they are equipped with controls requiring constant hand or finger pressure or are equipped with friction devices.
4. Cords and hoses must be kept out of walkways and off stairs and ladders. They must be placed so as not to create a tripping hazard for employees or to be subjected to damage from equipment or materials.
5. Hand tools shall be used for their intended purpose only. The design capacity of hand tools shall not be exceeded by unauthorized attachments.
6. Powder-actuated tools may be used only by assigned employees who have been instructed and trained in their safe use.
7. The use of powder-actuated tools is prohibited in explosive or flammable atmospheres.
8. Safe operating procedures provided by the manufacturers of powder actuated tools shall be followed explicitly.
9. Employees shall maintain all hand tools in good condition.

FIRE PREVENTION AND PROTECTION

1. Smoking is prohibited while using, dispensing or being around flammable or combustible liquids, or as otherwise posted.
2. Welding, cutting, or other open flame spark producing operations in areas classified hazardous are permitted only after a "hot work permit" has been issued by management.
3. Flammable and combustible liquids shall be used and stored away from ignition sources.
4. Flammable and combustible liquids shall be dispensed from approved safety cans and stored in approved safety cabinets.
5. Gasoline-powered equipment shall not be fueled while the engine is running.
6. Unobstructed access to fire extinguishers and other fire fighting equipment shall be maintained.
7. Employees shall know the location of the fire protection equipment in their work area.
8. Fire protection equipment once used shall be reported to management for servicing.
9. If a fire is discovered, employees shall immediately notify their supervisors, and provide the location and extent of the fire.
10. Only approved solvents shall be used to clean parts and equipment. Solvents shall not be left in open containers when not in use. They shall be stored in approved, closed containers.
11. Oily rags, trash, and other combustible scrap materials shall be placed in their proper receptacles.

WELDING & BURNING OPERATIONS

1. Compressed gas cylinders shall be secured in an upright position. Valves on compressed gas cylinders shall be protected by valve covers when the cylinders are not in use. Gauges shall be protected from falling objects when in use. Valves shall be shut off when cylinders are not in use.
2. Employees shall wear appropriate welding protective apparel, including proper density lens protection.
3. When arc-welding near other workers, non-combustible screens must be used to prevent welder's flash.
4. Oil and grease shall be kept away from oxygen and acetylene gauges and valves.
5. No cutting, welding or burning shall be conducted where there is oil, grease, flammable liquids or gases, or combustible materials without first removing them from the area. Should it be impossible to remove them, they shall be protected by a metal barrier or some fire retardant material and a fire extinguisher shall be on hand.
6. Cutting, welding or burning shall not be conducted on tanks or drums which have contained flammable liquids or grease until they have been thoroughly cleaned or other precautions taken to prevent fire or explosion.
7. Employees shall ensure there is adequate ventilation when welding, cutting or burning in confined spaces or with exotic metals.
8. Do not use matches to light torches. Spark igniters must be used. Torches must not be used to light smoking materials.
9. When a special wrench is required to operate the acetylene cylinder valve, the wrench must be kept in position on the valve.

HAZARDOUS ENTRY

1. Employees shall not enter closed or confined tanks, bins or vessels which have contained hazardous materials, atmospheric contamination, or conditions which could be injurious before an air quality check has been conducted.
2. Employees required to enter contaminated tanks, bins or vessels shall wear the appropriate respiratory protection, including self-contained breathing apparatus, as directed by management.
3. Employees performing hazardous entry work shall wear company approved safety belts and lifelines where there is a danger of falling. A second employee shall tend the lifeline from the outside whenever tanks, bins or vessels are entered, and shall wear the appropriate respiratory protection also.
4. Employees required to enter confined spaces containing power drive components or pinch point hazards shall use "lockout" procedures to insure there is no possibility of inadvertent movement or accidental start up. Lockouts shall be utilized.

MOBILE EQUIPMENT AND VEHICLES

1. Only authorized employees shall operate mobile equipment.
2. Mobile equipment operators shall perform "walkaround" safety inspections prior to getting on equipment. Discrepancies affecting safe operation shall be noted and reported to management immediately.
3. Employees shall wear seat belts in all equipment where provided. Equipment with Rollover Protection Systems shall not be operated without seatbelts.
4. Extraneous material shall not be allowed to accumulate in the cabs of equipment and vehicles.
5. Employees shall obey the posted speed limits and other traffic control signs. Operating speeds shall diminish accordingly with adverse weather conditions and reduced visibility.
6. Employees shall use the following horn signals when operating heavy mobile equipment:
 - a. One blast of horn prior to starting engine.
 - b. Two blasts of horn for forward movement.
 - c. Three blasts of horn for reverse movement.
7. Vehicles or mobile equipment shall not be coasted in neutral.
8. Dippers, buckets, scraper blades, scarifiers, dozer blades, rippers and similar movable parts shall be secured or lowered to the ground when not in use.
9. Employees shall not ride on the outside of mobile equipment.
10. Mobile equipment requiring automatic back-up alarms shall not be operated without the alarm functioning.

MOBILE EQUIPMENT AND VEHICLES (Cont.d)

11. Employees shall not work on or from a piece of mobile equipment in a raised position until it has been securely blocked in place. This does not preclude equipment designed specifically for elevated work usage.
12. Employees shall not get on or off moving equipment or vehicles.
13. Jumping on or off equipment is prohibited. Employees climbing on or off equipment shall face the equipment and use the handrails, handholds and steps provided.
14. Employees shall obey the mobile equipment and vehicle rights of way established.
15. Equipment or vehicles shall not be driven over compressed air or oxygen and acetylene hoses unless the hoses have been physically protected from damage.
16. The parking brake must be set whenever the vehicle is parked. Equipment parked on an incline must have the wheels chocked.

SAFE RIGGING PROCEDURES.

1. Cable clips shall be installed in accordance with established standards.
2. The weight of the load shall be determined to select the proper size of choker.
3. Sharp edges of the material to be rigged shall be protected to prevent damaging the choker and creating a hazard.
4. Tag lines shall be used when hoisting and rigging loads.
5. Material or equipment rigging shall not be rigged from structural points which are unstable (such as unfinished work, handrail, or conduit).
6. Chains, ropes, slings and hooks shall be inspected before each use. Damaged chains, ropes, slings and hooks shall be tagged and removed from service.
7. Loads suspended by cranes shall not be hoisted over other employees.
8. Employees shall not work under suspended loads.
9. All cranes and hoists must be inspected prior to use on each shift, and all deficiencies repaired before the equipment is used.
10. Employees shall use standard crane signals.
11. Accessible areas within the swing radius of all cranes must be barricaded to prevent employees from being injured by the counterweight.
12. Safety latches are required on all crane hooks.

LADDERS AND SCAFFOLDING

1. Job-made ladders must be constructed to conform with the established standards.
2. Manufactured ladders used on the job must be the heavy-duty industrial type.
3. Broken or damaged ladders must not be used. Repair or destroy them immediately. Ladders to be repaired must be tagged "DO NOT USE."
4. Short ladders shall not be spliced together to make a longer ladder.
5. All straight ladders must be tied off at the top.
6. The base of the ladder must be set back a safe distance from the vertical approximately one-fourth of the working length of the ladder.
7. Whenever ascending or descending a ladder, employees shall face the ladder and use both hands and feet.
8. Scaffolds shall be substantially constructed to carry the loads imposed upon them and to provide a safe work platform. All scaffolds more than 8 feet high shall have approved guardrails on all exposed ends and sides. Toeboards and screens shall be provided on a scaffold if persons are required to pass under it.
9. Guardrails, midrails, and toeboards must be installed on all open sides of scaffolds 8 feet or more in height.
10. Only approved scaffolds shall be used. Barrels, boxes and other makeshift substitutes for scaffolds shall not be used.
11. Scaffold planks must be at least 2- x 10-inch full thickness lumber, scaffold grade, or equivalent.
12. Scaffold planks must be cleated and must extend over the end supports at least 6 inches -but not more than 12 inches.

LADDERS AND SCAFFOLDING (Cont'd)

13. All scaffolds must be at least two planks wide; no employee may work from a single plank.
14. Scaffold planks must be visually inspected before each use. Damaged scaffold planks must be destroyed immediately.
15. Adequate mud sills or other rigid footing, capable of withstanding the maximum intended load, must be provided.
16. Scaffolds must be tied on to the building or structure at intervals which do not exceed 30 feet horizontally and 25 feet vertically.
17. Do not overload scaffolds. Materials shall be brought up as needed. Scaffolds must not be loaded in excess of one-fourth of their rated capability.
18. Where persons are required to work or pass under a scaffold, a screen of 18-gauge, 1/2-inch wire mesh is required between the toeboard and the guardrail.
19. Overhead protection is required if employees working on scaffolds are exposed to overhead hazards. Such protection must be a 2-inch plank or the equivalent.
20. Rebar is not to be used for scaffold supports.
21. Where adequate guardrails cannot be provided, employees shall wear the appropriate fall protection as required in rule number 3, Personal Safety Equipment section of this handbook.

EXCAVATIONS AND TRENCHES

1. All excavations must be sloped to the proper angle of repose, except in solid rock.
2. Materials must be placed 2 feet or more from the edge of the excavation. Precautions must be taken to prevent such materials from falling into the excavation.
3. Trenches 4 feet or deeper must be shored or sloped back to the angle of repose. Any excavation in unstable soil may require shoring or sloping.
4. Each excavation must be inspected daily. If evidence of cave-ins or slides is apparent, all work in the excavation must cease until necessary precautions have been taken to safeguard employees.
5. Where vehicles or equipment operate near excavations or trenches, the sides of the excavation must be shored or braced as required to withstand the forces exerted by the superimposed load. Also, stop logs or other substantial barricades must be installed at the edges of such excavations.
6. Materials used for sheeting, shoring, or bracing must be in good condition. Timbers must be sound, free of large or loose knots, and of adequate dimensions.
7. Safe access must be provided into all excavations by means of ladders, stairs, or ramps.
8. Trenches 4 feet or more in depth must have ladders spaced so that employee lateral travel does not exceed 25 feet. Such ladders must extend at least 3 feet above the grade level.
9. Walkways or bridges with standard guardrails must be provided where employees or equipment are required or permitted to cross over excavations or trenches.

DEMOLITION OPERATIONS

1. Employees shall utilize appropriate shoring in accordance with the demolition plan and to protect against weather forces.
2. Materials shall not be thrown to the ground or from upper floors to lower ones. Conveyances for lowering materials shall be used.
3. Barricades shall be placed around areas where materials are lowered to the ground and around the discharge end of material chutes.
4. Employees shall not remove material from chutes with their hands; the appropriate tools shall be used.
5. Cranes, hoists, derricks and other material handling equipment shall not be loaded beyond their capacity.
6. Taglines shall be used to guide suspended loads.
7. Employees shall not enter buildings or structures being demolished by wrecking ball or other mechanical means.

EXPLOSIVES

1. Only authorized employees shall store, transport, handle or use any explosive materials.
2. All explosives shall be stored, transported and used in accordance with the blasting procedures, Federal and State regulations.
3. Blasting at scheduled blasting times shall not commence until it has been made certain that no one is in the blasting area. Blasting at other than scheduled blasting times shall be authorized by management only.
4. Unattended explosives, explosive materials and open magazine storage shall be immediately reported to management.
5. Fuse shall be cut at a uniform length as directed by management; no one will be permitted to shorten a fuse.
6. NO ONE shall be permitted to handle a fuse or ignitor cord attached to a fuse.
7. All blasting circuits shall be provided with a safety switch which shall be locked in the open position, except when closed to fire a blast.
8. Safety plugs and shunts shall be installed in each permanent blasting line, and the shunt shall be kept in place except when the shot is to be fired.
9. Smoking, matches, open flame or other spark-producing devices are prohibited in or within 50 feet of explosives magazines or while explosives are being handled, transported or used.
10. Areas in which charged holes are awaiting firing shall be barricaded against unauthorized entry.
11. Employees shall examine the work place for misfired holes. Misfired holes shall be reported to management.
12. Misfired holes shall not be scaled or picked out.

EXPLOSIVES (Cont'd)

13. Misfired holes shall be reprimed and re-lasted at the regular scheduled blasting time or under direct supervision only.
14. All entrances to the blasting area, at other than the regular scheduled blasting time, must be physically guarded. A "Keep Out" or other warning sign is not considered an adequate guard.
15. In the event of a known misfire, no one shall enter the blast area for a minimum of 15 minutes when electric blasting caps are used and 1 hour with cap and fuse.
16. Vehicles containing explosives shall not be taken to a repair shop or garage for any purpose.
17. Explosives and detonators shall be transported in separate vehicles, or separate compartments of the same vehicle.
18. Explosives must be stored in approved magazines; unused explosives must be returned to the magazine immediately.
19. Detonators shall not be stored in the same magazine with other explosives.
20. Magazines and box-type magazines shall be suitably labeled.

MISCELLANEOUS

1. Split rim tires shall be inflated within protection of tire cages. Tires will be physically removed from rims before any welding, cutting or burning is performed on the rim.
2. Gloves shall not be worn while operating drill presses or bench grinders.
3. Bench grinder tool rests shall be maintained not to exceed 1/8 distance from the grinding wheel or brush.
4. Floor openings or holes shall be protected by approved guardrails or covers. If covers are used, they shall be strong enough to support the loads to be imposed upon them and shall be secured to prevent accidental displacement.
5. The open edges of all floors eight feet or more above the next floor or level shall be guarded by an approved barricade secured to prevent accidental displacement.
6. Do not remove covers on floor openings without approval of your supervisor. When a cover has been removed to bring in equipment or material, replace the opening immediately upon completion of material handling.
7. Do not remove warning signs or posts advising of floor openings or open covers.
8. Protruding reinforcing steel (rebar) shall be properly capped or otherwise protected to prevent a hazardous condition.
9. Repairs involving high pressure systems, such as air lines, receivers or compressed air equipment shall not be attempted until the pressure has been relieved.
10. At no time shall compressed air be directed toward an employee. Compressed air shall not be used to clean clothing being worn.
11. All air hose connections 1/2 inside diameter or larger shall be secured with approved safety ties.

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ACKNOWLEDGEMENT

This Safety Handbook is issued to you to help you avoid injuries on the job. Your signature below indicates to us you have received, read, understood and agree to abide by the contents of the booklet.

After you have read the booklet, sign this sheet, detach on the perforated line and personally return it to your supervisor.

Contracting Company

Contract Employee (Print)

Immediate Supervisor

Kerr-McGee Representative

Date

Contract Employee Signature

LINDSAY LIGHT II PROJECT

Emergency Contingency Plan

Title: Emergency Contingency Plan

Document Number: 500

Revision Number: 0

Approved By:

Date: July 25, 1996

Replaces: None

EMERGENCY CONTINGENCY PLAN

Lindsay Light II Site

Chicago, Illinois

U.S. EPA Region V

Office of Superfund

July 25, 1996

For Kerr-McGee:

J. Daniel White
Kerr-McGee Offsites Project Manager

Stephen L. Wampler
Registered Illinois #062-050383

David M. Jedlicka
Kerr-McGee Offsites Manager

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Figure 1	Emergency Phone Numbers
Figure 2	Hospital Route Map
Figure 3	Narrative Directions to Hospital

1. SCOPE OF PLAN

The purpose of the Emergency Contingency Plan (ECP) is to provide guidance and direction in the event of an unanticipated exposure of an individual to hazardous substances or hazardous conditions related to the excavation and restoration activities at the Lindsay Light II Site (Site).

Personnel assigned to this project will be required to review thoroughly the contents of this ECP and to strictly adhere to the policies and procedures provided herein.

2. EMERGENCY AND EVACUATION PLAN

2.1 EMERGENCY COORDINATION

The Field Team Leader will coordinate emergency response at the Site. In the event of an emergency, the Field Team Leader will immediately notify the Offsites Manager. The Offsites Manager will be responsible for notifying the proper response agencies listed in Figure 1, Emergency Phone Numbers. Emergency response procedures, instructions for emergency response to injuries, and evacuation plans will be reviewed at safety briefings.

2.2 EMERGENCY SERVICES CONTACTS

Before field activities commence, the Field Team Leader will inform the appropriate emergency contacts about the nature and duration of work expected at the Site and the type of contaminants and possible health or safety effects or emergencies involving these contaminants.

All hospital treatment should be provided via the 911 Emergency Medical System, with the Chicago Fire Department providing ambulance service. Emergency services can be provided by Northwestern Memorial Hospital. The location and possible route to the hospital from the Site are shown on Figure 2. Narrative directions are included on Figure 3.

The emergency telephone numbers listed in Figure 1 will be distributed to the Field Team Leader. Emergency numbers will be reviewed every three months by the Offsites Manager and revised, as necessary. The Offsites Manager will date and sign new revisions. The Field Team Leader will record the date of the revised telephone number list in his daily log book. Upon revision, the figure will be submitted to the U.S. EPA, and the City.

2.3 IMPLEMENTATION

The Field Team Leader will implement the emergency action procedures whenever conditions at the Site warrant such action. The Field Team Leader will be responsible for coordinating the evacuation, emergency treatment, and emergency transport of site personnel, as necessary, and informing the appropriate coordinating management staff. The following conditions may require implementation of emergency action procedures:

- Fire or explosion on-site.
- Serious personal injury.

- Release of radioactivity exceeding one Annual Limit of Intake (ALI) as defined in 32 IAC 340.1220 in a 24-hour period.
- Release of hazardous materials, including gases or vapors, at elevated levels.
- Unsafe working conditions, such as inclement weather (tornado, hail, etc.).

2.4 FIRE OR EXPLOSION

If fire or explosion takes place, emergency steps shall include: 1) evacuation of work area; and 2) notification of local fire department and other appropriate emergency response groups listed on Figure 1, as necessary (e.g., if a spill occurs, the emergency spill hotline will be notified).

2.5 PERSONAL INJURY

Actions to be taken in the event of personal injury are described in the Health and Safety Plan, Section 4.3.4, Emergency Medical Treatment.

2.6 EVACUATION PLAN

All project personnel will evacuate the area under the direction of the Field Team Leader. Evacuation from the affected area will be initiated by sounding an alarm, such as an air-horn, megaphone, or other form of notification.

A coordinated evacuation will be conducted with all project personnel using the most direct upwind route, avoiding the point of emergency.

All project personnel involved in the evacuation will immediately move to the ~~Decontamination~~/Transition area and will remain there awaiting further instructions from the Field Team Leader.

Personal Protective Equipment will be used at all times by the project personnel during the evacuation procedures.

2.7 ACCIDENT AND INCIDENT REPORTING

All accidents, injuries, and incidents shall be reported to the Field Team Leader. An Accident/Injury Form will be completed by the Field Team Leader, as described in the HASP, Section 4.4, Accident and Incident Reporting.

FIGURE 1 EMERGENCY PHONE NUMBERS

Police Department	911
Fire Department	911
Ambulance	911
Hospital	Northwestern Memorial Hospital
Address	250 E. Superior
Phone	(312) 908-2000 (Ask for ER)
Poison Control Center	(800) 732-2200
Illinois Department of Nuclear Safety (IDNS) Emergency Number	(217) 785-0600 (24 hour Radiologic Assistance)
Kerr-McGee Offsites Manager:	(708) 293-6332 (work)
David Jedlicka	(708) 276-8558 (pager)
	(708) 525-2345 (mobile)
Kerr-McGee Field Team Leader	(847) 823-1750 (home)
Bernie Bono	

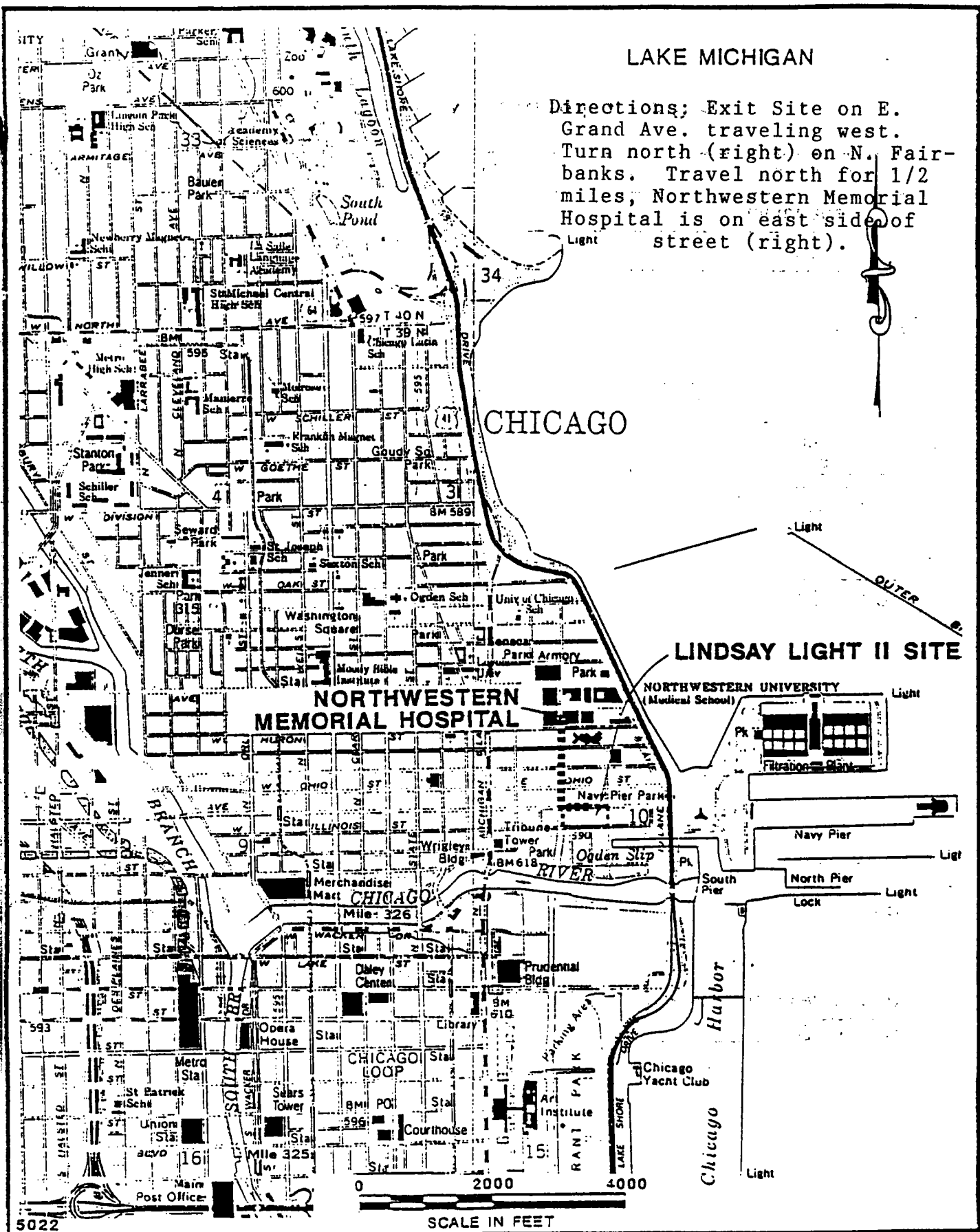
SECONDARY EMERGENCY NUMBERS

The Offsites Manager will evaluate when these agencies should be notified.

National Response Hotline	(800) 424-8802
Illinois Emergency Management Agency	(217) 782-7860
Illinois Environmental Protection Agency Emergency Response Duty Officer	(217) 782-7860 or (217) 782-3657, IEPA ERU during normal working hours.
U. S. Environmental Protection Agency (U.S. EPA) Project Manager	Verneta Simon (312) 886-3601

Revised By: _____

Date: _____



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 ENVIRONMENTAL
 consulting and engineering
 DENVER, COLORADO

FIGURE 2
ROUTE TO HOSPITAL

FIGURE 3 NARRATIVE DIRECTIONS TO HOSPITAL

DIRECTIONS FROM THE SITE:

Exit Site on E. Grand Avenue traveling west. Turn north (right) on N. Fairbanks. Travel north for 1/2 miles, Northwestern Memorial Hospital is located on east (right) side of street.

SE-5J

November 15, 1996

VIA FACSIMILE AND U.S. MAIL

Mr. J. Dan White
Kerr-McGee Chemical Corporation
123 Robert S. Kerr Avenue
Oklahoma City, Oklahoma 73102

RE: Lindsay Light II Site, Chicago, Illinois

Dear Mr. White:

This is in response to your letter dated November 1, 1996, in which you requested a modification to the workplan. The request if allowed would permit overburden from the site which is less than 7.1 pCi/g (total radium) being placed back into the excavation after the excavation has been "cleaned" to meet the 7.1 pCi/g cleanup standard.

After reviewing this request, this Agency has determined that your workplan modification will be allowed with the proviso that the overburden be placed at the bottom of the excavation and that off-site backfill be placed on top of the overburden.

Also please be aware that this modification applies only to on-site material and that the 3.7 pCi/g standard for acceptable off-site backfill material still applies.

If you want to discuss any matter further, please contact me at (312) 886-3601.

Sincerely,

Verneta Simon
On-Scene Coordinator

bcc: Frank Rollins, SE-5J
Fred Mücke, SE-5J
Larry Jensen, AE-17J
Jim Mitchell, AE-17J
John Perrecone, P-19J
Nancy-Ellen Zusman, CS-29A
Dave Seely, SR-6J
Becky Frey, SR-6J

SE-5J

November 22, 1996

VIA FACSIMILE AND U.S. MAIL

Mr. J. Dan White
Kerr-McGee Chemical Corporation
123 Robert S. Kerr Avenue
Oklahoma City, Oklahoma 73102

RE: Lindsay Light II Site - **Backfill/Overburden Direction**

Dear Mr. White:

This letter is intended to provide more direction in implementing the modification you proposed earlier this month regarding filling excavations with overburden that is less 7.1 pCi/g total radium. After placing overburden in an excavation, please top this excavation off with either **2** feet of backfill or **1.5** feet of backfill and **6** inches of gravel or CA-6.

If you have questions regarding this letter, please contact me at (517) 741-7327 or leave a voice mail message at (312) 886-3601.

Sincerely,

Verneta Simon
On-Scene Coordinator

bcc: Larry Jensen, AE-17J
Fred Micke, SE-5J
Jim Mitchell, AE-17J
John Perrecone, P-19J
Debbie Regel, SE-5J
Frank Rollins, SE-5J
Nancy-Ellen Zusman, CS-29A